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JOURNAL OF THE ROYAL SOCIETY OF ARTS

CONTENTS

NOTICES

Next Week—Council—Second Ordinary Meeting—Cantor Lectures—Preservation of Ancient Cottages . . . . pp. 25-28

PROCEEDINGS OF THE SOCIETY

Opening Meeting of the 176th Session—"Fifty Years of Electrical Science and Industry."
By LLEWELLYN B. ATKINSON, M.I.E.E., Assoc.M.Inst.C.E.—Discussion pp. 28-55

MEETINGS

Meetings of Other Societies During the Ensuing Week . . . . pp. 55-56

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C. 2

ONE HUNDRED AND SEVENTY-SIXTH SESSION, 1929-30

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NOTICES

NEXT WEEK

MONDAY, NOVEMBER 18th, at 8 p.m. (Cantor Lecture.) E. G. RICHARDSON, B.A., Ph.D., D.Sc., Lecturer at University College, "Wind Instruments from Musical and Scientific Aspects." (Lecture I).

Demonstrations will be given on the various instruments.

WEDNESDAY, NOVEMBER 20th, at 8 p.m. (Ordinary Meeting) P. MORLEY HORDER, F.S.A., "Urban and Rural Amenities." ROGER FRY will preside.

FIRST ORDINARY MEETING

WEDNESDAY, NOVEMBER 6th, 1929. MR. LLEWELYN B. Atkinson, M.I.E.E., Chairman of the Council, delivered his Inaugural Address on "Fifty Years of Electrical Science and Industry."

The Address will be published in the *Journal* on November 22nd.

REPRINTS OF CANTOR AND SHAW LECTURES

The three Cantor Lectures on "The Treatment of Coal," by Dr. C. H. Lander, C.B.E., M.Inst.C.E., M.I.Mech.E., and the three Shaw lectures on "Thirty Years' Experience of Industrial Maladies," by Sir Thomas Morison Legge, C.B.E., M.D., have been reprinted in pamphlet form (price 2*s*. 6*d*. each), and can be obtained from the Secretary, Royal Society of Arts, John Street, Adelphi, W.C.2.

A complete list of Cantor, Howard and other lectures, which are available in pamphlet form, can be had on application.

HISTORY OF THE ROYAL SOCIETY OF ARTS

Further copies of the History of the Royal Society of Arts by the late Sir Henry Trueman Wood, the existing supply of which was recently exhausted, are now available, and can be obtained, price 15*s*. net, on application to the Secretary. The History, a large octavo volume of 558 pages with a large number of illustrations, gives a well documented account of the many and various activities of the Society from its foundation in 1754 to the year 1880.

PROCEEDINGS OF THE SOCIETY

INDIAN SECTION

FRIDAY, NOVEMBER 8TH, 1929

D . T. DRUMMOND SHIELS, M.C., M.P., Parliamentary Under-Secretary of State for India, in the Chair.

The following paper was read:

THE INDIAN CINEMATOGRAPH INDUSTRY

By A. M. GREEN, I.C.S.,

Acting Trade Commissioner for India

In the paper which I have the honour to read before you this evening I hope to exhibit to you a happy but rare event, no less than the birth of an industry in India without the benefit of non-Indian money or brains, and without the encouragement and almost without the knowledge of any of the Indian Governments or Government departments. It follows that I shall not be much concerned and I hope this will not disappoint my hearers with the theory or practice of censorship as applied to films in India. In fact, if I mention censorship, the mention will only be incidental, and will deal mainly with the special Indian aspects of censorship which tend to hamper the industry of film production. My primary purpose, then, is to give you a brief account of the origin and present condition of Indian film production, and to venture on some brief speculations as to its possible developments.

Before I go further it is but right that I should indicate what qualifications I have for addressing you on a subject which would seem to require both technical and commercial knowledge. I confess at once that I can lay no claim to the former, and only to the latter in the capacity of a civil servant, whose avocations for the past fourteen years have brought him into constant touch with the commercial community in India, and for the last eight months in England. On the other hand, I have since 1922 been an *ex officio* member of the Bombay Board of Film Censors, a board which is the busiest of all the Indian Boards, and which is situate in the area where the indigenous producing industry is most active. I was also one of the two official members of a small committee of six which was appointed by the Government of India two years ago, to examine and report *inter alia* " on the organisation for the exhibition of cinema films and the film-producing industry in India." This committee, which was known as the Indian Cinematograph Committee, travelled between nine and thousand miles over the length and breadth of India, including Burma, examined some 350 witnesses in the capital towns of practically every province, paid flying visits to a number of smaller places, attended numerous public performances and private views, and inspected a dozen producing studios. Our activities led to a report which was published in the summer of 1928, and had a happier fate than most blue-books, for not a few copies were actually bought, and perhaps read, by the public in India and elsewhere. Further, the Government of India is, I understand, at present considering the views of the provincial Governments on our recommendations. Whatever be the upshot, the members of the committee at least obtained some insight into the Indian industry, its technique or lack of technique, its finances, and its commercial and cultural possibilities.

At the very outset of our enquiry we were faced by a difficulty that, in the sequel, appeared to us remarkable, and this was that from no source, official or unofficial, could we obtain really reliable statistics or even an adequate conspectus of the position regarding the distribution, the exhibition, and still less, the production, of films in India. The prevailing opinion in both official and non-official circles was that the production of Indian films was negligible, and that the sway of American films was unchallenged. But we soon discovered that Indian films were being produced in astonishing numbers, that despite their great technical inferiority they were infinitely more popular with Indian audiences than imported films, and that exhibitors could, and did, pay a higher rent for Indian films than for any foreign films, except some of those featuring well-known stars such as Charlie Chaplin, Harold Lloyd, or Douglas Fairbanks. After we had examined and collated the figures supplied by the Boards of Censors, we discovered that in the year ending 31st March, 1927, no fewer than 155 indigenous feature films had been produced, 108 in India proper and 47 in Burma. The number of feature films produced in the United Kingdom was but 48 in the calendar year 1927, and 26 in the year before. This comparison of the English and Indian figures will, I think, be as surprising to you as it was to us.

When we tried to discover the actual origins of the producing industry, we could find nothing very definite. Actually, the first Indian film seems to have been one produced by a Mr. Phalké and screened in Bombay in 1913. This gentleman produced several successful films, and his business eventually became the Hindustan Film Co. of Nasik, which is still one of the leading Indian producing concerns. No accurate information could be gathered about the development of the industry between 1913 and 1921, when at last statutory censorship boards were set up and began to keep classified records. In the year 1921-22, 63 indigenous feature films were examined by the boards in India and 10 in Burma, or 73 in all. This does not, of course, mean that all the 73 films had been produced in one year, for when the boards were instituted all existing films had to obtain from them a certificate before they could be again publicly exhibited. In the next year 103 films were examined, and undoubtedly this number also included a proportion of old films, as in the following year only 85 indigenous films came before the censors. In 1924-25 the number was 96, and in the following year came a surprising jump to 145 Thus, in four years the number of films produced had certainly more than doubled.

What had doubtless been happening since Mr. Phalké made his initial success was this. It had been discovered that to produce a film of a sort, crude, but nevertheless attractive to an average Indian audience, required little technical skill and relatively little finance. Hindu mythology in particular supplied popular scenarios ready to hand, with no possible trouble about copyright, and the Indian sun made elaborate studios and artificial lighting unnecessary luxuries. Indian photographers already abounded, and as no high standard was required, the development of film negatives and the printing of positives presented no great difficulties. Cinema cameras and raw film became increasingly easy to obtain · of actors of a sort, and of scene painters and carpenters there was no dearth. A vacant plot of land with an outhouse or two, and with mirrors or boards covered with silver paper to reflect the light, constituted an adequate studio. And so one after another locally trained or semi-trained camera-men started studios of their own. Some, of course, failed, but not a few survived, and when our committee took stock, no fewer than 21 concerns were found to be producing films in India proper and 17 in Burma.

Most of the regular Indian producers are at work in the Bombay Presidency If one company in the state of Kolhapur and another in Baroda be included, 15 of the 21 are in that province, and 9 of them are actually in the town and island of Bombay. Less than half the total produce a steady output of films, the remainder produce spasmodically as they can raise the necessary working capital. Nevertheless, one Bombay concern produces as many as 15 films in a year, despite the fact that "shooting" is impossible for three or even four months out of the twelve, when the monsoon rains beat down into and flood their open-air studios. Calcutta is the only other part of India where there is any appreciable production, and of the four concerns there, only one, Madan Theatres, Ltd., has hitherto produced regularly. In Madras successful Indian films have been produced, but for various reasons the producing companies did not survive. In Delhi the well-known film, "The Light of Asia," was produced under the auspices of the Great Eastern Film Corporation, but, as will be seen later, this was not a purely Indian film, and does not strictly come within my purview. In Rangoon, however, there has been a remarkable output of Burmese films in recent years. There are in Rangoon no fewer than 17 producing agencies, although only about four are firmly established concerns with a steady output.

I have already given figures to show how rapidly Indian production has grown and how large a number of films are now available, but to gauge the hold which Indian films have won on the affections of Indian audiences we must know what proportion of the available screen-time they command. Actual figures are not available, but a close approximation can be obtained by comparing the footage of Indian films examined by the Boards of Censors with the total footage so examined. The figures are, I think, very remarkable. In 1921-22 the Indian footage represented 9.03 per cent. of the total, and in 1927-28 no less than 21.2 per cent. The actual footage rose from less than half a million to nearly 1½ million, or by over 200 per cent. Such an expansion is all the more striking seeing that the period was one of trade depression, when the raising of capital for any form of speculative or even industrial enterprise was difficult in the extreme. Again, the percentages I have quoted indicate less than the true position. Indian films often have longer runs and are screened more times a day than imported films, and it is to my mind certain that indigenous films occupy a distinctly higher proportion of the total available screen-time than 21 per cent. The British Films Act of 1927 aimed at ensuring that after eight years 20 per cent. of the screen-time in British houses should be devoted to British films. The Indian industry had done better than this by its own unaided efforts before the British statute had become law.

I have already hinted that no very high standard of technique has hitherto been demanded or attained. The real truth is that the general standard is remarkably low in every respect. Most progress has been made in the actual photography, though it is of course a long way below western standards, and this is the more praiseworthy because of the lack in India of methods of precision, the constantly varying actinic value of natural light, and the difficulties that high temperatures cause in film laboratory work Only two or three producers have hitherto used artificial light, and probably only one, the Maharashtra Film Co. of Kolhapur, with success. Marvellous and all-pervading as is the Indian sun, expert witnesses told us that for good film shooting natural light requires at times to be modified and corrected by artificial means. Cameras and raw stock are, of course, all imported, and developing and printing devices are either imported or improvised. The imported apparatus is not usually of the latest pattern. Again, the camera-men and technical staff generally are largely self-taught, only a very few have been out of India, and of these not all have had any training or experience worth the name The artistic and dramatic eye is naturally missing, and any new photographic effect is almost invariably an imitation of effects witnessed by the operator in imported films.

The same criticisms apply to most of the directors and scenario writers It has hardly been recognised that the composition of a good scenario demands *a special technique, even when a good film story is ready to hand. Accordingly almost all indigenous films are long-winded and, to the occidental eye, lacking in dramatic appeal; and the action is seriously impeded by the clumsy length of the captions, which are sometimes thrown on the screen in as many as four* languages. The films themselves, again, are usually much longer than a western audience would tolerate, lengths of 10,000 feet, which require 2½ hours screen-time, being not uncommon for a feature film. But this is not necessarily a handicap in the case of Indian audiences, who are habituated to dramatic and other entertainments lasting long hours. Consequently, few Indian producers have yet felt the need for that careful revision, compression and editing, which give such a finish and impression of speed to the best western films. The fault can also be traced back to the fact that Indian producers first gave most of their attention to film versions of well-known tales of Hindu mythology and religion. Here they rightly reckoned on their audiences' pre-existing knowledge and love of the subject, and had no great incentive to strive for dramatic effect or even coherence. Such films command large and enthusiastic audiences, and obviously will continue to do so for many years. As an example of this, I may mention that quite the worst film which we saw, a film on the life of Sankaracharya, in which the direction, acting, continuity and photography were all of the crudest, held entranced a large Calcutta audience, mostly of educated Bengalis, who normally are the most literary and æsthetic of all the Indian peoples. Their intense love for the subject blinded them to the manifest imperfections of its presentation. A similar audience in this country, however popular the subject, would have had its money back or wrecked the theatre. The cost of this Bengali production, we were told, was about £375.

Popular though the religious or mythological film was and is, producers, as time went on, felt that the more sophisticated urban audiences needed other fare. Consequently they tried their hands on secular dramas, taking their subjects from Indian history, real or imaginary, and from modern Indian life. Here their lack of imagination and artistic propriety is evident They copy the most blatant faults of western films, and have recourse wholesale to direct plagiarism, both for incidents and even for whole plots. The results to the cultured eye, European or Indian, are frequently ludicrous, especially in the case of social dramas, which, more often than not, are merely American plots incongruously garbed in Indian dress and settings. Such films may draw audiences from that part of the uncultured urban population in Bombay and other big cities which has acquired the cinema habit, but all Indian audiences undoubtedly prefer—and I hope will continue to prefer—films of which the inspiration is really Indian.

I have already indicated that the technical staff of the Indian studios is essentially untrained. Such is the scarcity of trained men, or even semi-trained men, that often one man combines several functions, and is at once producer, director and even camera-man. But a still greater problem is the supply of actors, or rather actresses. There are many excellent dramatic performers in India, but the profession, as indeed was the case in England not so very many years ago, is, to say the least, not very highly accounted. In reputable Indian dramatic companies the women's parts are still, as in

Elizabethan days in England, played by men or boys. This expedient has even been tried for film work, but met with well-merited failure. Thus actresses have been found essential, and in the past have mainly been drawn from the dancing-girl class. This reacts on the supply of actors, who in the circumstances can seldom be obtained from the more select or cultured classes. It also reacts more or less on all connected with the industry, to which a certain stigma undoubtedly attaches. Consequently, it is seldom that men of culture or education are attracted to the industry, either as actors, producers, or even financiers. Happily, however, there are honourable exceptions, of which I will make some mention later, and signs are not wanting of a general improvement.

Some of the larger studios maintain permanent companies of actors and actresses and pay them regular monthly salaries. In these companies a "super" may draw £2 or more a month, and a star– for there are stars—as much as £60 The difficulty of obtaining respectable Indian actresses has opened an avenue of employment to Anglo-Indian girls. Some of them play Indian roles with real skill, and are among the most popular stars. One of them, who goes by the stage name of Sulochina or Water Lily, is a Jewess whose family presumably came from Iraq. In a short space of time she rose from being a telephone girl on about £9 a month to a film star on a salary six times as high. My Indian colleagues on the Committee at first thought that no Anglo-Indian girl could adequately mime an Indian woman's gait and postures. They, however, hailed the heroine of a film viewed in Calcutta as the best and most beautiful Indian film actress whom they had hitherto seen, and on being told that she was no Indian but an Anglo-Indian, handsomely admitted their error.

Time does not permit me to describe all the other difficulties which Indian conditions impose on Indian producers, but a few must be briefly mentioned. First and foremost is the difficulty of a limited market. In the whole of the vast Indian Empire, including the Indian States, there were only about 360 permanent cinema houses two years ago, and I doubt whether the number has since become much greater. Practically speaking, a cinema theatre does not pay in India proper in towns of less than 50,000 inhabitants, unless special circumstances exist, such as the presence of British troops, large industrial works, or a considerable student population. Such towns number less than one hundred. In Burma, where the standard of living is higher, theatres can be successfully run in smaller towns. Now the amount of money that can be put into the making of a film depends on the amount of money that it can win when exhibited. The smaller the number of houses that can show it, the smaller must be the returns and the more economical the production. The big American producers can afford to spend millions of dollars on a single film because they have a world-wide market from which to recoup their overhead expenses. The Indian producer must be sparing in his outlay because he only has a small home market. And his home market is not only small in itself;

it is not even homogeneous. Most of the better-class houses cater for Europeans or cultured Indians who cannot stomach the average Indian film, except occasionally as a curiosity, because of its technical shortcomings. Nor are all Indian films suitable for all Indian audiences. Thus, provincial differences in Indian culture are such that a film based on Bengali life may be utterly unacceptable to a Bombay audience. The multiplicity of languages is another difficulty which is only partly solved by repeating captions in two or more languages. Illiteracy is still another difficulty, for a caption in a man's own language is useless if he cannot read it. But the biggest difficulty of all is the religious difficulty. Naturally a Mohammedan will not wish to see a film based on and glorifying the Hindu religion, and will normally stay away when such a film is screened. But think of the many fine film stories that might be drawn from Indian history, from the heroic exploits of the Rajputs, and from the glamorous splendours of the Great Moguls. The Indian producer has in some cases attempted to deal with such subjects, but has to walk very delicately. Partly because of his lack of skill, and partly because of the undue sensitiveness of the religiose, the censors have not infrequently had to make rigorous excisions or even to prohibit public exhibition altogether. Even when there is no dispute about the accuracy of the representation of a historical incident, objection may have to be taken on the ground that it may excite communal enmity and lead to a breach of the peace. Even a film prepared for exhibition at a baby week almost failed to pass the censors, on the ground that its subject matter might offend deep-seated susceptibilities. How seriously such considerations must crib, cabin and confine the Indian producer is only too evident. Taking into account these and the difficulties previously mentioned, the advance of the industry hitherto has been remarkable indeed.

The cost of producing the ordinary indigenous film of about eight to ten thousand feet may be as low as £375, and seldom exceeds £2,000. The average cost is certainly not higher than £1,500, and is probably nearer £1,000. In view of the demand for these films and the relative cheapness of their production, it is not surprising that the profit to be made out of them is considerable. The Bombay producers admitted that, taking the rough with the smooth, they made an average of 10 per cent. on their money, but though we assured them that we would say no word to the income tax authorities, they declined to show us any figures. Finally we formed the distinct impression that their profits were very much higher than they indicated. One producer told us informally, when we were inspecting his studio and our reporters were not present, that one of his films which had cost Rs. 30,000 to produce had brought back to him within a year no less than Rs. 100,000, or a clear profit of 233 per cent.

I have already stated that indigenous films command a better hire and yield a better return to the exhibitor than the ordinary run of imported films, and this is capable of demonstration by official figures. There is in Bombay an entertainment tax, which of course imposes on exhibitors the duty of making returns of revenue to a supervising authority. At our request this officer extracted from his registers figures relating to six leading cinema houses. These figures showed that in the first half of the year 1927 the three leading cinemas in Bombay which had exhibited only imported films realised between them Rs. 242,061 from their taxed seats, while the three leading cinemas which had only shown Indian films realised from their taxed seats Rs. 283,580. Thus the Indian films won by over £3,000 in six months. Actually this is an understatement, because seats costing 4 annas and less are not taxed and are not included in the returns. The revenue from the 4 anna seats in the cinemas showing imported films is inconsiderable, but the 3 and 4 anna seats in the cinemas showing Indian films are normally crowded and yield a very considerable revenue.

The reason for the popularity of indigenous films is not far to seek. After all, we all appreciate what we understand best, and the familiar, for a time at least, is also the popular. Hence, the average Indian audience likes to see films which, whether they exhibit the past or the present, the religious or the secular, represent Indian, or at least oriental life, habits and scenes. In this connection it is significant that probably the most popular imported film ever screened in India was the pseudo-oriental film featuring Douglas Fairbanks as the Thief of Baghdad. But familiarity is not always popular; it also breeds contempt. Of this an enterprising tea planter gave us an interesting example. He organised free cinema shows for his labour force, but found that they took very little interest in imported films. He then tried to get for them Indian films, but found the rental exorbitant. Undaunted, he next bought a camera himself, shot the every-day scenes in his tea garden, and exhibited them to his labourers, who were delighted to recognise themselves and their companions amid the familiar sights of their daily round. But after a time they came to the planter and said " So far so good; now show us how the sahibs live." The town and city dweller is, of course, no less desirous of variety; and herein lies the real danger which is facing the Indian producer. If he wishes to retain his existing market, he must cease to imitate and must improve his product. Can he do this ? I think he can if he will set about his task in the right way.

Hitherto most producing concerns have been managed by small men of as little business as of artistic training and instinct. Working capital has been lacking and has perforce been borrowed at high rates. In most cases production is not systematized, with the result that there is serious waste of time and money. In fact, the industry is inefficient, not only in technique but also in business methods. Three of the members of my Committee thought that money could be attracted to the industry, and its efficiency improved, by the enactment of legislation forcing all exhibitors to devote 50 per cent. of their screen-time to indigenous films within a maximum period of ten years, and recommended accordingly. They also recommended various forms of State aid. The remaining half of the Committee, of whom I was one, felt most strongly that, in view of the share of available screen-time which indigenous films had already won, a quota was entirely unnecessary, and further that its imposition would only perpetuate inefficient production, and lead to loss of existing audiences, the financial embarrassment of exhibitors, and a decrease instead of the desired increase in the number of cinema houses. In a minute of dissent we argued that what the industry required was organisation and business-like management, and we suggested that the publication of our report would bring to the notice of business-men that the producing industry had great possibilities. We accordingly envisaged the formation of limited companies, with adequate capital, management and technical staff, for the production and distribution of pictures, and also for the erection, at a later stage, of cheap but adequate theatres. We expressed the belief that such organisations would be able to produce infinitely better films at no greater expense than the crude films produced hitherto, and that the improvement in quality would prevent indigenous films losing their popularity and would pave the way for a larger circulation and an increased market. Lastly, we pointed out the scope for co-operation between East and West, and the possibility of such co-operation leading to the production of some Indian films of sufficient merit to obtain a market in the more critical countries of the West.

Such co-operation has not been entirely lacking. "The Light of Asia," which I have already mentioned, was a film based on the life of Buddha, produced under the auspices of an Indian company, acted mainly by Indians and shot almost entirely in India. The actual making of the film, however, was in the hands of non-Indians, though the artistic direction was partly Indian. Unfortunately, for reasons into which I need not enter, the film was an artistic rather than a financial success, and the Indian company relapsed into inactivity. More recently, in 1927-28, an enterprising British company sent technical staff to India, and in collaboration with Mr. Himansu Rai, who had played a leading part in "The Light of Asia," and actors entirely recruited in India, shot a film based on a fanciful tale written by Mr. Niranjan Pal, who was also the author of "The Light of Asia" scenario, on the building of the Taj Mahal. This film, entitled "Shiraz," has already enjoyed a "pre-release" run at a leading London house, and may, I understand, be enjoying another run at this moment I trust this picture will be successful financially, for an artistic success it certainly is. The same firm, again co-operating with Messrs. Himansu Rai and Niranjan Pal, and an all-Indian cast, has more recently produced another Indian film entitled "A Throw of Dice," which has already been trade shown and has, I think, prospects of winning great popularity on western as well as eastern screens.

Side by side with these films I would place a 100 per cent. Indian film which was produced two years ago by two cultured Parsi gentlemen, one of whom actually directed it. It is entitled "Sacrifice," and is based on a work of the famous Bengali poet Rabindranath Tagore. After a first and successful run in Bombay, its makers took the only positive copy to Calcutta to negotiate further releases. Whether dissatisfied with the offers received, or inspired by a laudable ambition, they brought the film to England to see whether they could tap the more extensive and remunerative markets of Europe. When we presented our report the result of their courageous enterprise was unknown Subsequently it was learnt that they had succeeded, and that the world rights outside India of their film, suitably edited and reprinted, had been bought by a powerful film corporation. The film was also registered under the British statute as a British film, having been entirely produced by British subjects and in British territory. I witnessed it in India before its final editing, and found the plot strong and gripping, the presentation artistic, and the photography much above ordinary Indian standards. Some of the actors were persons of education and culture, a leading part being taken by a university graduate who gave a really fine performance. Here then is a leading case to show that purely Indian films of a better type than the ordinary can already be produced, and if produced can even aspire to a place on non-Indian screens

The notable success achieved by the makers of " Sacrifice " and the publication of the Committee's report led to the formation of many schemes for the production of Indian films. Some were too ambitious, some were not ambitious enough, and few seem to have come as yet to fruition. The most promising venture that I have heard of is the flotation by the makers of " Sacrifice " of a public limited company known as the Orient Pictures Corporation, Ltd They have, I understand, interested Europeans resident in India, as well as Indians in their company, and have ordered out up-to-date technical plant of good quality, including a powerful mobile lighting plant. I am also informed that a large studio of the latest design, containing a specially planned laboratory and offices, is to be erected. The corporation hopes to start shooting films this month or next, and to produce one film a month. It intends to draw its actors from the educated classes, and has already secured the services of Indian ladies as well as gentlemen. Before long I hope to see some of their productions on British screens. An all-Chinese film has recently been commercially shown in London. If Chinese, why not Indian ?

Another venture of which I have recently had word is that of the Indian proprietor of " Pathé India," a business which distributes films as well as all kinds of cinema machinery and raw stock. This gentleman is contemplating the conversion of his business into a limited company, which, in addition to existing activities, will itself produce silent, and perhaps talking, films, and establish a chain of theatres by acquiring old, or erecting new, houses. Madan Theatres Ltd., who already control a large circuit, were understood to be about to improve their studio and to increase their production of Indian films, but I gather that the advent of the " talkie " has given them pause, as indeed it did to producers in other countries.

It is to be hoped that some at least of these ventures will be successful and will be able to put on the Indian market a regular supply of improved films at moderate prices, and thus preserve and diffuse more widely the taste for indigenous films. And by their agency the crying need for more theatres, or in other words, a wider market, can best be satisfied. But the burden should hardly be borne on their shoulders alone. The Government of India and some at least of the Provincial Governments have begun to realise that the film may be a most potent engine for propaganda on behalf of public health, agricultural improvement and the like, and for mass education in general. A lead has been given by the Indian Government railways, whose Publicity Department not only tries to attract tourist traffic, but has actually co operated with agricultural and other officials to produce, for free exhibition to the cultivator, films illustrating improved agricultural methods and rural betterment. The railways have taken the long view, rightly holding that anything which tends to increase agricultural production will eventually bring them increased traffic. Open-air shows are given along the railway lines, and delight audiences numbering thousands. A whole show does not consist of educational or propaganda films: commercial films of high entertainment value are inter-mixed, and thus the pill is gilded. But while giving great credit to the originators of such propaganda, my Committee could not help feeling that much of the time, thought and money expended on this valuable work was being wasted, owing to the absence of expert assistance. From this the producers of propaganda films were suffering even more than the producers of Indian entertainment films. We accordingly strongly recommended a co-ordination of effort by the establishment of a central bureau with expert advisers, to meet the expenses of which all departments of the Central and Provincial Governments should be invited to subscribe, and which should arrange to produce propaganda films for all India, either in its own or in commercial studios. While our report was in the press our Secretary received a memorandum indicating that an official bureau more or less on the lines we contemplated had been in existence for eleven years in Canada, and had apparently been eminently successful. If a bureau be established in India there is every reason to hope that it will not only greatly improve and expand film propaganda and mass education, using perhaps the sound as well as the silent film, but will also guide and assist, by example and precept, the indigenous commercial industry. Whether a bureau will be established or not I do not know, but it is encouraging to find that an expert film producer is likely soon to go out to India for employment under the Railway Board.

I have, I fear, left myself no time to talk of the future, but perhaps the potentialities of the film in India are already apparent. That the cinema is an influence for good in India all the members of the Committee, by the end of our enquiry, were convinced. At present it only touches the merest fringe of India's millions, but those whom it does touch it undoubtedly in some measure educates. It draws the lowest classes from the grog-shop, and others from less desirable entertainments. It enlivens existences that are too often drab and monotonous, and may serve to alleviate the disturbance of India's "pathetic contentment" by inducing its devotees to adopt new and more enlightened ways of work and of life. I believe that the leaven is beginning to work, and that the despised film is capable of helping on the ferment by causing a mild and desirable intellectual awakening among the masses. He would be a bold man who would prophesy how either India or the cinematograph will stand a few years hence, but perhaps I may indulge in a fleeting vision in which I see an Indian village of the future, where, as the cattle come home of an evening, the headman switches on the wireless for the daily news bulletin and market intelligence, and where in the village hall or schoolroom a talking film in turn amuses and instructs "kiddies and grown-ups too." First the sewing machine, then the bicycle, the gramophone and the motor became familiar sights in rural India. Is then my vision so extravagant?

DISCUSSION.

LIEUT.-GENERAL SIR WILLIAM FURSE, K.C.B., D.S.O., Director of the Imperial Institute, said he left India in 1893 and had never been back there, so that he was not familiar with the present state of the country, nor had he any technical knowledge with regard to films. He had been greatly interested, however, by the very informative account given of the efforts of indigenous producers in India and the success they had met with, at any rate with Indian audiences. The suggestions made by the lecturer towards the close of his remarks gave much food for thought For the last three years the Imperial Institute had had some experience with cinematography, the Empire Marketing Board having given them the apparatus, and also maintaining it, for the purpose of giving the rising generation in this country an attractive insight into the life and conditions in our Empire overseas, particularly so far as agricultural conditions and mineral resources were concerned He knew, therefore, how difficult it was to keep up a sufficient and adequately varied supply of really well-produced films for such a purpose.

The film provided a marvellous medium for the right kind of education, by which he meant one which educated an audience without their being aware of it. The ideal producer would be a scholar who knew how to impart his scholarship in an attractive way, and if he was helped by a photographer who was a real artist, wonderful things could be done. He had been pleased, therefore, to hear the lecturer refer to the possibility of co-operation between such experts and the people of India.

The Empire Marketing Board were determined to go on with the work, to let the youth of the Empire learn in an attractive way something about life in the different parts of the British Dominions.

MR. H. BRUCE WOOLFE (Managing Director, British Instructional Films, Ltd.) said that as one who knew something of the trials and difficulties of film production he must congratulate the pioneers of the film industry in India on their achievements. The lecturer said that in India there were 360 theatres. In England there were 4,000 England, moreover, enjoyed the advantages of a single language and no religious difficulties to speak of ; yet the percentage of screen time occupied by indigenous productions in this country was nothing like so large as that occupied by indigenous productions in India. Those who had brought such a position about were certainly to be congratulated.

It must be a joy for the producers in India to feel that a large and enthusiastic population was waiting to acclaim their work ; he wished that was the case in England. There was, however, one danger in that situation. The film was not national, but international ; and if producers became content to make films which satisfied the lower elements of their home population, but which could not be shown on the screens of the world, they would not make much progress. A world market was essential for progress and real success, but he saw no reason why Indian films should not obtain it.

Of two of the films the lecturer mentioned he could speak from personal experience, because they were made by his own company. " Shiraz " had been shown in the leading theatres of all the principal European countries ; it was being shown in Australia and South Africa as well as India, and was now bringing in revenue from the U S.A. The revenue accruing to his company from that film from the continent of Europe was higher than they had obtained from any other film they had handled, and he thought the final figures would head their list of receipts from foreign sales. It was too early yet to say what would happen with the film " A throw of dice." When it was half-completed the " Talkie " boom commenced, but already the receipts from the continent of Europe was very little behind those of " Shiraz."

There was every prospect, therefore, that if Indian films, acted entirely by Indians and made entirely in India, were produced according to Western standards, they would meet with a welcome on the screens of the world ; if Indian producers showed foresight and courage they should have no difficulty there.

He was pleased to hear the Indian railways were fostering the use of instructional films. Russia produced large numbers of cultural films ; in Italy a film of that type must be shown at every performance ; when an educational or cultural film was shown in Germany, a certain amount of entertainment tax was remitted ; France was supporting an organisation for the collection and distribution of such films ; Belgium, Czechoslovakia and several other European countries were doing a great deal to further the exchange and distribution of films which, as General Furse had said, educated people without their being aware of it. In England, however, very little was being done Could it be that this country was right and all the other countries were wrong ? It was a question which should be pondered over

MR. RUSHBROOKE WILLIAMS said that on listening to the paper he felt the same sort of melancholy, almost as it were post mortem, satisfaction as Huss would have felt could he have looked down from the heavens on the Reformation, for in 1920 he did his best to get the Government of India to face the question Through the patriotic action of one of the largest film-producing houses in England he had been successful in obtaining a preliminary survey by an expert, at the film-producing company's own cost. He was sorry to say the report of that expert was pigeon-holed ; had action been taken on it, it might have simplified the valuable labours of the Indian Film Committee.

The cinema in India was among the most important of all educative influences. Like the lecturer, he had been struck by the immense enthusiasm displayed by the man in the street in India for films dealing with Indian history and legends. The displaying of such films in theatres other than those which specialised in imported films was even commoner up country than in the big Presidency towns

It seemed to him the influence of the cinema in India might work along two converging lines. First of all, the very real interest taken even by the poorer classes in India in films which dealt, for example, with some incidents in the Mahabharatha was likely to give a new meaning and colour to the old traditional culture. With the combination of Eastern taste and Western skill, the man in the street would find the range of his interests enlarged, moreover, and in addition to the representation of his own culture he would demand some touch of the West. Along those two lines progress was likely in the near future.

Though suffering from the lack of the latest apparatus and properly-equipped studios, the Indian producer had certain great advantages. He had the most wonderful range of public and historical buildings in the world round which to group his scenario, and had at hand a very cheap and picturesque crowd In American films, for example, in the larger productions a considerable part of the cost was incurred in hiring crowds. Once the technical side of picture-making was improved in India, those advantages would make themselves felt.

The film " A throw of the dice " was filmed in Jeypore, by the courtesy of the Government there, and no doubt large numbers of Indian States, containing wonderful relics of Mughal and Hindu architecture, would be willing to help any company which desired to film an incident or story within their borders.

SIR ATUL CHATTERJEE, K.C.I.E., High Commissioner for India, thought Mr. Rushbrooke Williams might be mistaken in imagining his representations to the Government of India were without effect ; it was probably as a result of them that the Indian Films Committee was appointed.

With the progress of time India, with its population of 320 millions, ought to provide a fairly large audience for purely Indian films, but he was most anxious that a correct and vivid presentation of Indian life should be available for the world at large, and he agreed with Mr. Bruce Woolfe in thinking that Indian producers should aim at a world market. There was a very large demand all over Europe and America for really correct descriptions of life in India ; India had suffered through incorrect presentations, and the Government of India were most anxious for improvement in that respect.

He had been struck by what the lecturer had said as to the length of Indian films. It was natural that, judged by Western standards, Indian films should seem long. Indian audiences were accustomed to very long dramatic performances, and liked to have full value for their money ; moreover, very little in the way of entertainment was available to enliven the dull and drab lives of the Indian industrial worker and peasant.

The lecturer had referred to the cultural possibilities of the film industry in India, and personally he thought there were very great possibilities in that direction A large number of educated Indian men and women were looking to the film industry for employment, and he believed many of those now engaged in it were highly educated people ; the lady who took the principal part in " Shiraz " was a distinguished university graduate. That indicated that the cultural possibilities of the film in India were very great. India had always been interested in dramatic performances, and would no doubt utilise the film as a cultural instrument, just as she used the drama in former days.

By the cinema and by broadcasting it should be possible to bring about a complete transformation of Indian village as well as town life. The dissemination of accurate and interesting news and useful information about agriculture and the various other pursuits of the people was extremely important. If the cinema industry was developed by agricultural, educational and local authorities as well as by the Government of India a real transformation could be brought about, and broadcasting should be utilised in the same way. Anything which brought interest into the dull lives of the villages would be a most potent form of education and tend to raise the standard of living. At present there was a sort of vicious circle; the standard of living was low and people could not go to the cinema, and because cinemas and so on were not well patronised people had difficulty in understanding the need for a rise in the standard of living and the necessity of earning more wages and becoming more efficient in the modern sense of the word.

MR. E. FOXEN COOPER (of the Colonial Films Committee) said the cinema industry appeared to have begun in India in the same way as it was started in this country; it was taken up, he gathered, by people of the showman class rather than by educated men, and at first films were looked on merely as a form of entertainment, and were not of a very high order. In India as in England, however, it would probably develop into one of the most vital ways of educating every class of the population. He agreed with the lecturer that the cinema in India should prove an educational instrument of the highest order The Colonial Films Committee, it might be of interest to remark, was at present carefully examining the best means of using the cinema to educate the natives of the various colonies

MR. G W. DAWSON (Indian Railways Publicity Department) said the lecturer had stated that the film industry in India had grown up without Government assistance, and that the Indian railways in producing propaganda films were handicapped by lack of technical knowledge, which had led to a certain wastage of effort. As one connected with the work of the department which produced those films he would like to give an account of what had been done.

In the last three years 70 films had been made, at an average cost of £140 each, the funds allotted were very small. The films were made to secure rural uplift and to appeal to the ryot class. Just as the ordinary Indian producer had to make his films to suit his market, making them long, and making the action slow so that the people could follow it, so also the films he was describing had to be made to suit their audience. Except for tourist films, no attempt was made to make films for people outside India.

There were now eight cinema cars running on the Indian railways, and during the last official year 766 open air shows were given, to an audience of 1,600,000 people; sometimes the audience was as large as 30,000, all sitting in the open air. There were also special agricultural demonstration trains which toured the country The fact that a man had a great deal of technical knowledge did not necessarily make him a good producer of films; he must have a flair for choosing his subject and visualising his treatment of it The Government of India did not take technical knowledge as the only criterion.

MR. S. G. TALLENTS, C.B., C.B.E. (Secretary Empire Marketing Board) said that India was to be congratulated on the position she had achieved. In this country, so far as films were concerned, we were permanently bullied by America Russia, having been cut off since the war from the rest of the world by a sort of *cordon sanitaire*, had developed a great film industry of her own, however much one might dislike some of the causes to which it was applied; and he gathered India was now going to do the same sort of thing.

He hoped Indians would not listen too much to what was said about an international market. If good Indian films were to be produced, the first thing was for

Indians to make the best films they could from a purely Indian point of view. If they were good enough, they would find a market elsewhere.

He was a little surprised by Mr. Foxen Cooper's statement that films rose from the entertainment level to the instructional level; personally, he thought the two things were different; on the one side there was the art of the cinema, and on the other side its instructional aspect, though such a film as Mr. Bruce Woolfe's "Life of a Plant" was a masterpiece in both fields.

One of the great problems which had to be faced was the bridging of the great gulf which existed all over the world between the results of scientific research and their application on the farms and in the villages. He believed the cinema held unlimited possibilities for bringing the discoveries of the laboratories to the service of the men who should apply them in the fields, and the lecturer suggested that in India a real attempt might be made to make films of that kind. If that were done, India would give a lead to the whole Empire which was badly needed.

The story the lecturer told of the tea planter who tried to interest his men in the cinema reminded him of an incident which happened on a plantation in Africa, where the owner took a film of his workmen, who came with great interest to see it. It so happened, however, that one of the men who appeared on the film died a few days afterwards, and when the labourers saw the picture of the dead man on the screen they fled in a body!

The LECTURER, in reply, said he wished in the first place to thank the Chairman for sparing the time to be present and preside that afternoon; it showed the deep interest he took in Indian affairs. All those who had spoken agreed that the cinema in India had immense possibilities. Mr. Bruce Woolfe suggested that if the Indian producer would hitch his wagon to a star he had a great world market before him. Personally, he feared it would be a long time before that happened, and in any case there was a big market to be found in India. To get a world market for Indian films it might be necessary to make use of that terrible blight, the "universal appeal," which was usually an appeal to the worst rather than to the best; but if the films were really Indian, though they might appeal to a certain number of people, they could not appeal very frequently to the man in the street in England or America. It was only occasionally that one could hope to see an Indian film in England.

Mr. Dawson's remarks were interesting as showing that more had been done in India by Government than he himself had realised, but he thought his criticism still stood: the spirit was excellent, but the execution was not very good. So far as the films were intended for home consumption they were all right, but he had yet to see an Indian film that was good enough for propaganda in this country, and still less in America. He hoped, therefore, that expert assistance would be forthcoming on the technical side and Indian production would improve.

THE CHAIRMAN, on behalf of all those present, thanked the lecturer for his interesting address, and congratulated him on the very hard work which, as a member of the Committee in India, he had done to produce their report.

Personally, he regarded the production of indigenous films of Indian life, suited for exhibition to Indian audiences, as very important. He agreed that a world appeal was also important, but thought that the picturesqueness of life in India would have a universal appeal if properly presented. The first concern, however, must be to interest and entertain the people of India themselves. He would like

India to be affected by all the forces which were having a world effect, and undoubtedly the cinematograph was one of these. He said that not only in the hope that India would modify it and direct it to her own advantage, but also so that India might make in that direction, as in many others, a contribution for the lack of which the world was poorer at the present time.

A great factor in India was the cheapness of production. Though the wonderful light obtainable for the greater part of the year did not entirely remove the need for artificial illumination in some cases, it was a tremendous advantage, and there could be no doubt the situation in regard to light in this country had been one of the factors which had hindered the development of English films. Moreover, as had been pointed out, the picturesqueness of the crowds and their ready availability was another factor which cheapened production.

The advent of the "talkies" had practically paralysed the home industry, at least for a time. In India their effect would be twofold. There were so many vernaculars that a talkie in one language would not be of much use for people who spoke another, but on the other hand, a talkie in one of the commoner languages should make a big appeal to an illiterate audience who could not read the ordinary captions.

The difficulty of securing actors and actresses in India was interesting to notice and was another instance of how the conditions of development in India were similar to what they had been in this country. Many people were fond of stressing the differences between East and West; personally, he was always more surprised at the great similarity between them. It was necessary to foster the spirit in India as it had been necessary to foster it at home, that work which was for the welfare or recreation of the people was honourable work.

A lot had been said about dull villages, and the importance of the cinema there There might be a danger that the film industry, if left to private enterprise, might for financial reasons not reach the villages. One reason for the depopulation of the countryside in Australia, and especially where an attempt was being made to form group settlements, was that the women in particular wanted to move to the nearest town, where there was a cinema. It would be a pity if anything happened in India to increase the drift to the towns. The railways, by their cinema cars had shown one way of overcoming the difficulty, but there were many thousands of miles in India where no railway existed. The question might be considered therefore, of having motor outfits which could tour the villages, either under private enterprise, if it was likely to be financially successful, or undertaken by Government These motors could show instructional films, with some spicy ones added to give entertainment.

Personally, he was especially anxious that health films should be shown in that way. He believed it would pay the Government to show throughout India films exhibited in that or other ways which would teach simple lessons in hygiene and preventive measures against the great endemic and epidemic diseases which took such a toll of life there. In any development of the cinema that should not be forgotten

He was interested to find that Charlie Chaplin was popular in India. When his friends became pessimistic about India he always said that he found such a fine sense of humour amongst Indians that he could not but be hopeful for their country because where there was a sense of humour there was a sense of proportion and good judgment.

He was glad to see so many people present and taking an obvious interest in India, and he was sure they had all benefited by the lecture

The proceedings then terminated.

OBITUARY

Sir Valentine Chirol.—Sir Valentine Chirol, who died on October 22nd, at the age of 77, at his London home in Carlyle Square, was born on May 23rd, 1852, the son of the Rev. Alexander Chirol, of Catsfield, Sussex. After receiving his education mainly in France and Germany, he became a clerk in the Foreign Office in 1872. Resigning his clerkship after four years in the Foreign Office, he spent the next sixteen years travelling in the Near and Middle East and elsewhere, frequently as correspondent of the old London *Standard.* In 1892, at the invitation of Moberly Bell and Sir Donald Mackenzie Wallace (then the Director of the Foreign Department of *The Times*), he became *The Times* correspondent in Berlin. When he went to Berlin, the relations between the British and German Governments were on a friendly footing and Chirol speedily established close personal contact with Baron Marschall von Bieberstein, then Foreign Secretary, and at a later date German Ambassador at Constantinople, and with Herr von Holstein, a leading figure in the German Foreign Office. As long as Caprivi was Chancellor, Chirol was in sympathy with the aims of German policy, which at that time was not unfriendly to this country, and, when in 1894, a proposal was made for a British lease of a strip of Congo territory between Lakes Tanganyika and Victoria to facilitate the construction of the projected Cape to Cairo railway, Chirol strongly supported the German view that such a lease would be contrary to the spirit of the Zanzibar Agreement. When, however, in the same year the Emperor replaced Caprivi by Hohenlöhe, the spirit of German policy underwent a change and the strong line taken by Chirol, in *The Times*, in regard to the famous " Kruger " telegram led to the doors of the German Foreign Office being closed against him and to a virulent campaign of abuse in the German Press. About a year after this episode, Chirol went to *The Times* office in London as deputy to Sir Donald Wallace, whom he succeeded as Director of the Foreign Department in 1899, remaining in that post until his retirement in 1912. India and the East was always one of his strongest interests. He made many journeys to India from 1883 onwards, and sympathised with many Indian aspirations. He was frequently consulted by Lord Morley in regard to the Morley-Minto programme of reforms, and his letters to *The Times*, afterwards published in the form of a book entitled " Indian Unrest," embodied his appreciation of the Indian situation and some frank criticism of many leading personalities, both English and Indian. Chirol was selected in 1920 to deliver the first of the annual lectures instituted in memory of Sir George Birdwood, his subject being " The Enduring Power of Hinduism." He also took part from time to time in the discussions of papers read at meetings of the Indian Section

Joseph Leeming, F.R.I.B.A.—Mr. Joseph Leeming, who had been a Life Fellow of the Society since 1902, died on October 8th last, at the age of eighty, at Old Colwyn, North Wales, where he had been living since his retirement from professional work some twenty-five years ago. Born at Halifax, Yorkshire, he was the son of Mr. Alfred Leeming, of that town, and after being educated privately, was articled to Mr. Luke Horsfall. He commenced practice on his own account at Halifax in 1872, and in partnership with his brother was the architect of a large number of important public buildings in Yorkshire and Lancashire.

NOTES ON BOOKS

LIFE AND WORK OF SIR NORMAN LOCKYER. By T. Mary Lockyer and Winifred L. Lockyer, with the assistance of Prof. H Dingle. London: Macmillan & Co., Ltd. 18*s*. net

For various reasons the position occupied by Lockyer amongst the greater Victorian scientists is not one which lends itself very readily to assessment; but it would be difficult to imagine a more satisfactory method of presenting his work in its true light than that which forms the basis of this biography. So many of the controversies which he initiated are still living issues that something more than a mere history of his own investigations is needed; and it is, therefore, of peculiar value that in the second half of this volume a number of eminent authorities should have contributed critical appreciations of Lockyer's work in relation to the most recent views.

The desirability of such a treatment seems to arise from the unusual degree in which Lockyer was accustomed to think in advance of his facts. The caution with which his brilliant speculations were often received by the scientific world was due, not so much to a necessity for mental readjustment, as to a real scarcity of positive evidence by the light of which the new views might be judged. It remained to be seen whether the evidence, when it should accumulate, would be favourable or the reverse. In some cases, of course, it was favourable; but in others the original suggestion was shown to need great modification, or even abandonment; while others again, and those amongst the most important, are still unsettled problems.

Of the immense practical value of speculations of this type there can be no doubt; though they may be stigmatised as far-fetched, and may cause irritation in certain quarters, they act as unrivalled stimulants to experimental work Lockyer himself puts the point in a nutshell when, in the course of a discussion with Father Secchi, he writes: "Sans une hypothèse qui dirigeait mon travail, j'aurais bien certainement beaucoup moins interrogé le Soleil que je ne l'ai fait", and he quotes with telling effect Faye's epigram: "Une bonne théorie est aussi nécessaire qu'on bon télescope."

The detailed appraisement of Lockyer's work, to which reference has already been made, is preceded by a biography of more usual type, occupying just over half the book. Even here, however, the treatment remains somewhat impersonal: the career, rather than the man, is displayed. That career, it is perhaps needless to remark, was extraordinarily rich and many-sided, in the Victorian manner. It was also pursued, at all events in the earlier years, under conditions of unusual disadvantage; for Lockyer's official position, from 1857 until 1875, was that of a clerk in the War Office, his duties in this capacity consisting largely in acting as permanent editor of the Army Regulations. It is true that from 1870 he was lent as secretary to the Duke of Devonshire's Royal Commission on Scientific Education, and never actually returned to the War Office; but the whole of his valuable early work on the constitution of the sun was carried on in such hours as could be spared from his official duties; and our admiration does not diminish when we learn that in 1869 he took a leading share in the foundation of *Nature*, becoming the first editor of that periodical, an office which he continued to hold for no less than fifty years.

From 1875 the situation began to improve, as in that year he was formally transferred from the War Office to the Science and Art Department; but his position remained somewhat ill-defined and irregular, and the tentative and temporary nature of his appointments must for many years have been a source of anxiety. It was not until 1886 that his employment was put on a regular basis by his appointment as Lecturer in Astronomy at the Normal School of Science, the title of the office being changed to that of Professor in the following year.

His main life-work the application of spectroscopic methods to the problems of astronomy and cosmogony—is admirably set forth in these pages. His great store of energy, however, found outlet in numerous other directions. Leaving out of account such minor ventures as the compilation of an annotated handbook embodying the Rules of Golf, and the projected (though, unfortunately, not quite realised) publication of a book on "Science for Artists," we find an astonishing record of valuable work of a secondary character. Of this, perhaps the most important was the tireless pressure exerted in forcing on the attention of successive reluctant Governments their responsibilities towards Science in this country; and his achievements in this field alone would have sufficed to win for him the gratitude of his scientific successors.

THE TYPOGRAPHY OF NEWSPAPER ADVERTISEMENTS. By Francis Meynell. London: Messrs. Ernest Benn, Ltd. 2 guineas.

A great many people ought to know by now that Mr. Francis Meynell is a man of taste; quite a large number are aware that he is one of our leading typographers.

The advance of typography is part of that general counter-offensive of the arts against philistinism which marks the post-war decade. Quantity has been tried and found wanting; quality stands a chance of coming into its own. Machines having become universally familiar, their products will more and more have to be mixed with art if they are to be attractive. Printing, for instance, has got to be *fine* printing, or it will no longer tell.

Mr. Meynell, though a writer, publisher, printer and typographer himself, writes about his subject with a beautiful and critical detachment. He sees the wood in spite of the trees. If one can become sufficiently insensitive to the amazing exaggerations and absurdities with which advertisement abounds, it is clear that the æsthetic activity which its presentation evokes may be found absorbing and delightful.

The rules of this special art are analysed by Mr. Meynell with perfect lucidity. It is a visual art, involving principles familiar to the student of painting, and indeed of any of the fine arts. As time goes on we may hopefully expect that greater restraint and a better sense of proportion will be shown by the humbler as well as by the rare and distinguished members of Mr. Meynell's calling.

The æsthetic appeal of a fine, illustrated advertisement is, however, bound to be impure: tainted with a non-æsthetic purpose, which is, to make people buy such-and-such an article. Again, Mr. Meynell's analysis of the psychological principles at issue is admirable.

The introductory essay is followed by ninety pages of type specimens, whose set piece, in the great legibility trial, is the famous: "Quousque tandem abutere, Catilina, patientia nostra?" After that we get tables of the measurements of types—all most useful—and finally a "gallery of contemporary advertisements."

This is a book which need not be recommended; I should not be surprised if it became a kind of best seller, and again, a limited fine-paper edition would probably be bought up with eagerness by people in every part of the world.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY, NOVEMBER 18..Architects, Royal Institute of British, 9 Conduit Street, W. 8 p.m. Mr. Alan E. Munby, "The Design of Science Buildings"

Arts, Royal Academy of, Burlington House, W. 4 p.m Prof. Dr. A. P. Laurie, "Methods of Wall Painting."

Brewing, Institute of, at Charing Cross Station Hotel, Strand, W.C. 7.45 p.m. Prof. Dr. R H. Hopkins and Mr. J. A. Burns, "The Proteolytic Enzymes in Germinating Barley."

Electrical Engineers, Institution of, at the University, Liverpool. 7 p.m. Dr. N. W. McLachlan, "The Theory and Practice of Modern Loud Speakers."

Geographical Society, at the Aeolian Hall, New Bond Street, W. 8.30 p.m Mr. Carveth Wells, "The Colour of Ruwenzori."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 7 p.m. Mr. A. G. Brown, "Artificial Lighting of Factories and Public Buildings. (Joint Meeting with Students' Sections of the Institution of Civil Engineers and Institution of Electrical Engineers.)

Public Works, Roads and Transport Congress, at the Royal Agricultural Hall, Islington, N. 2.30 p.m. Mr H. C. Head, "Tar in Road Making and Treatment." Mr G. Marlow Reed, "Local Authorities and the Safety First Movement."

University of London, at King's College, Strand, W.C. 5.30 p.m. Dr. H C Barnard, "The Education of Girls in France under the Ancien Régime." (Lecture I.)

At King's College, Strand, W.C. 5.30 p.m. Rev G. R. Woodward, "Ecclesiastical Music Lecture II -Carols"

At King's College, Strand, W.C. 5.30 p.m. Prof H. Zickendraht, "Scientific Radio Research in Switzerland." (Lecture I.)

At the London School of Economics, Houghton Street, W.C. 4.30 p.m. Mr. E H. Warmington, "The Debt of Medieval Explorers to Ancient Discoverers." (Lecture I.)

At University College, Gower Street, W.C. 2 p.m Dr. O. L Brady, "England in Shakespeare's Day Lecture VI - Alchemy and the Alchemists."

At University College, Gower Street, W.C. 5.30 p.m Miss E. J. Davis, "How London became the Capital of England." (Lecture I.)

TUESDAY, NOVEMBER 19..Anthropological Institute, 52 Upper Bedford Place, W.C. 8.30 p.m. Prof. W J Sollas, "The Sagittal Section of the Human Skull"

Arts, Royal Academy of, Burlington House, W 4 p.m. Prof. Dr. A P. Laurie, "The Theory of Colour and its Application to Painting"

Automobile Engineers, Institution of, at the Engineering Scientific Club, -Wolverhampton. 7.30 p.m Mr. W. H. Goddard, "The Mercedes-Benz Diesel Engine."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Prof. E G. Coker, "Some Experimental Methods and Apparatus for Determining the Stresses in Bridges and Framed Structures."

Heating and Ventilating Engineers, Institution of, at Milton Hall, Deansgate, Manchester. 7 p.m. Mr O. Stott, "Fan Standardisation Committee's Report"

Historical Society, at Bruce Grove School, Tottenham, N. 6.30 p.m. Miss D. Dymond, "St. Anselm."

Public Works, Roads and Transport Congress, at the Royal Agricultural Hall, Islington, N. 11 a.m Mr. B. Price Davies, "The Arrangement and Economics of a Town Plan."

3 p.m. Miss J. F. Abram, "The Inter-relation of Public Services and Town Planning."

Statistical Society, at the Royal Society of Arts, Adelphi, W.C. 5.15 p.m. Prof. J. H. Jones, "The Present Position of the British Coal Trade."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.45 p.m. Informal Meeting. Opener—Mr. W. Oldham.

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. Sir B. Pares, "Russian History to 1861. Lecture VI—John the Dread."

King's College, at 40 Torrington Square, W.C 5.30 p.m. Dr. J. Krzyzanowski, "The Polish Novel in the 19th Century. Lecture V—Eliza Orzeszkowa and her Fight for the Oppressed."

At University College, Gower Street, W.C. 5.30 p.m. Col. D. C. Cameron, "Some Administrative Difficulties of Mechanisation."

At University College, Gower Street, W.C. 6.30 p.m. Mr. E. T. Elbourne, "Engineering Management." (Lecture II.)

Zoological Society, Regents Park, N.W. 5.30 p.m Scientific Business Meeting.

WEDNESDAY, NOVEMBER 20..Arts, Royal Academy of, Burlington House, W. 4 p.m Prof. Dr A. P. Laurie, "Early Methods of Oil Painting."

Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Students' Meeting. Address by Mr. G. C. Bunn, Chairman of the Committee of London Students.

Electrical Engineers, Institution of, at the Royal Victoria Hotel, Sheffield 7.30 p.m. Mr A. Tustin, "Organised Scientific Research and Engineering Progress."

At the Cleveland Technical Institute, Middlesbrough 7 p.m.

Geological Society, Burlington House, W. 5.30 p.m

Literature, Royal Society of, 2 Bloomsbury Square, W.C. 5.15 p.m.

Mechanical Engineers, Institution of, at the Grand Hotel, Sheffield. 7.30 p.m. Mr H. J. Davies, "The Effect of Shape and Surface Conditions on the Resistance of Materials to Repeater Stresses."

Meteorological Society, 49 Cromwell Road, S.W. 5 p.m. (1) Mr. M. G. Bennett, "The Physical Conditions controlling visibility through the Atmosphere" (2) Dr L. F. Richardson, "The Reflectivity of Woodland Fields and Suburbs between London and St. Albans." (3) Thora C. Marwick, "The Electric Charge on Rain."

Microscopical Society, 20 Hanover Square, W. 8 p.m (1) Dr. P. de Beauchamp, "*Dicranophorus hudsoni* (Glascott)." (2) Dr. J. A. Hewitt, "Sarcocystis in Human Heart Muscle." (3) Mr. T. E. Wallis, "The Projectograph · an Optical Instument for the Projection of Images of Microscopical Objects."

Public Health, Royal Institute of, 37 Russell Square, W.C. 4 p.m. Dr. Malcolm Donaldson, "The Early Diagnosis and Treatment of Malignant Disease."

Public Works, Roads and Transport Congress, at the Royal Agricultural Hall, Islington. 11 a.m. Mr G H Hargreave "A Simplified Method for the Design of Single Span Frame Bridges." Mr. C S Chettoe, "The Widening of Highway Bridges."

3 p.m Mr. T. Pearson Frank, "Bituminous Road Surfacing." Dr. Percy Spielmann, "Road Emulsions"

United Service Institution, Whitehall, S.W. 3 p.m Colonel A. Brough, "Modern Military Bridging"

University of London, at King's College, Strand, W.C. 5.30 p.m H.E. The Esthonian Minister, "Modern Esthonian Literature. Lecture I Esthonian Folk-Lore."

At King's College, Strand, W.C. 5.30 p.m. Prof H Zickendraht, "Scientific Radio Research in Switzerland." (Lecture II.)

At King's College, Strand, W.C. 5.30 p.m. Prof. W. T. Gordon, "The Contribution of King's College to the Advancement of Learning during the Century 1829-1928. Lecture VII Geology and Geography."

At the London School of Economics, Houghton Street, W.C. 6 p.m. Lecture VII on "Office Machinery."

At University College, Gower Street, W.C. 3 p.m. Dr. C. Pellizzi, "La Lirica del Paradiso" (Lecture III)

At University College, Gower Street, W.C. 5.30 p.m. Mr. I. C. Grondáhl, "Some Norwegian Writers of the Present Day (Riksmaal)." (Lecture III.)

At the Royal Veterinary College, Great College Street, N.W. 5.30 p.m. Major G. W. Dunkin, "Recent Researches on Immunization against Distemper in the Dog." (Lecture III.)

THURSDAY, NOVEMBER 21..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 7.45 p.m. Captain L. W. Johnson, "The Inspection of Metals and their Alloys." (Joint Meeting with Institution of Automobile Engineers.)

Chemical Society, Burlington House, W. 8 p.m. (1) Mr. T M. Lowry, "The Rotatory Dispersion of

Organic Compounds Part XVIII—The Validity of Drude's ·Equation." (2) Messrs G M Bennett, F Heathcoat and A. N Mosses, "The Influence of the Sulphur Atom on the Reactivity of Adjacent Atoms or Groups Part III—δ- and ε- Chlorosulphides" (3) Messrs G M Bennett and W. B Waddington, "Studies in the Penthian Series Part II—Penthian-4-one" (4) Messrs G M Bennett and W B Waddington, "Studies in the Penthian Series. Part III—Stereoisomeric Derivatives of some Penthianols" (5) Messrs F. G Angell, A D K Drew and W Wardlaw, ", A New Interpretation of the Isomerism amongst Co-ordination Compounds of Platinum"

Electrical Association for Women, 46 Kensington Court W 7 p m Mr H Bourne, "How Electric Heaters Cookers and Cleaners are wired, and why they get out of order"

Electrical Engineers, Institution of, Savoy Place, W C 5 30 p.m Discussion on "Low Temperature Carbonisation of Fuel with special reference to its Combination with the Production of Electricity' Introductory papers by Messrs F H Smythe and E G Weeks (English practice) Mr J McEwen (American practice), Prof Dr Ing P Rosin (German practice)

At University College, Southampton 7 30 p m Dr J W T Walsh, "Illuminating Engineering"

Historical Society, at Wandsworth Technical Institute High Street, Wandsworth, S W 8 p m Mr H Wilson Harris,' Ten Years of the League of Nations

Linnean Society, Burlington House W 5 p m

L C C, The Geffrye Museum, Kingsland Road E 7 30 p m Mr E J Warne, Mouldings their Proportion and Place in Design"

Mechanical Engineers, Institution of at the Queen's Hotel Birmingham 6 30 p m Mr J F Lea Coal Measurement"

At the Hotel Metropole, Leeds 7 30 p m Mr H J Davies, "The Effect of Shape and Surface Conditions on the Resistance of Materials to Repeated Stresses"

Mining and Metallurgy Institution of, at Burlington House, W 5 30 p m

Public Works, Roads and Transport Congress at the Royal Agricultural Hall, Islington N 11 a m Mr G L Pepler, 'Water Supply as a Factor in Town and Regional Planning" Mr F C Temple 'Successive Separation in Sewage Disposal Systems Mr H D Bell, "The Application of Bleaching Powder as an Auxiliary Treatment of Sewage"

3 p m Dr. W Rushton, "The Purity of Drinking Waters from the Biological Aspect Dr J B Firth 'The Preservation of Rivers and Streams from the Standpoint of Water Supply Some Observations on River Pollution" Mr H Criswell "A Simple Treatment of Super-elevation, Transition Curves and Vertical Curves" Dr Percy Spielmann 'Road Research."

Rubber Technologists, Institute of, at the Manchester Cafe, Exchange Buildings, Manchester 7 p m Mr R. Defries, "Unburstable Balls"

University of London, at Bedford College for Women Regent's Park, N W 4 30 p m Prof Eccles "Montaigne" (in French) Lecture VII

At King's College, Strand, W.C 5 p m Dr W Robson, "Protein Metabolism" (Lecture II)

At King's College, Strand, W C 5 30 p m Mr T J Dunhill, "String Music"

At King's College, Strand, W C 5 30 p m Mr I L Evans, "Austria in the Eighteenth Century' (Lecture II)

At King's College, Strand, W.C 5 30 p m Dr J A Williamson, "The Cabots and the Discovery of the New World" (Lecture II)

At University College, Gower Street, W.C 5.15 p.m Prof. J. E. G. de Montmorency, "Momentous Lawsuits and Trials in various Countries from Classical to Modern Times" (Lecture II)

At University College, Gower Street, W.C. 5 30 p.m Prof. W M. Dixon, "England, The Bible, and Shakespeare" (Lecture III)

Victoria and Albert Museum, South Kensington, S.W 5 30 p m Mr M W Brockwell "The Van Eycks"

FRIDAY, NOVEMBER 22.. Chadwick Public Lecture, at the Royal Society of Arts, Adelphi, W C 8 15 p m Prof A E Boycott, "The Causes of Cancer"

Engineering Inspection, Institution of, at the Royal Society of Arts, Adelphi, W C 5 30 p m Mr T W Willis, "Saws their Manufacture and some Hints on their Use"

Junior Institution of Engineers, 39 Victoria Street S W 7 30 p m Mr H D Bush, "The Quick Running Oil Engine as applied and used in Railway Service"

Mechanical Engineers, Institution of, Storey's Gate S W 7 p m Mr J S Atkinson, "The Utilization of Low-grade and Refuse Fuels, including Towns' Refuse"

At the Merchant Venturers' Technical College, Bristol 7 p m Mr W Sisson Chairman's Address on 'Standardisation"

Physical Society, at the Imperial College of Science and Technology, South Kensington S W 5 p m (1) Mr D P Dalzell, "Heaviside's Operational Methods' (2) Mr E T Hanson, "The Dynamical Theory of Resonators' (3) Mr E C Atkinson "Escapement Errors of Pendulum Clocks"

Public Works, Roads and Transport Congress, at the Royal Agricultural Hall, Islington, N 11 a m Mr D B Price Davies, 'Economical and other Considerations in connection with Roads and Bridges" Mr H P H Morgan, "Practical Points to be considered in the Improvement and Widening of Main Roads'

3 p m Mr W J Jones, "The Application of Electricity to Roads from the point of view of Street Lighting and Traffic Signalling" Mr J Hunter Smith, 'Reflections on the purposes and Scope of Agricultural Education Captain G A Wright 'Land Drainage"

University of London, at King's College, Strand W C 5 30 p m Prince D S Mirsky, The Russian Drama Lecture VI—The Poetic Drama from Pushkin to Musorgsky"

At King's College, Strand, W C 5 30 p m Prof H Zickendraht, "Scientific Radio Research in Switzerland" (Lecture III)

King's College, at 10 Torrington Square, W C 5 30 p m Dr O Odlozilik, "Outlines of Czechoslovak History Lecture I—The Geography of Czechoslovakia The Early Settlers The Great Moravian Realm"

At the King's College for Household and Social Science, 61 Campden Hill Road, W 5 p m Prof V H Mottram, "Human Nutrition" (Lecture VI)

At University College, Gower Street, W C 5.30 p m Prof W M Dixon, 'England, The Bible, and Shakespeare" (Lecture IV)

SATURDAY, NOVEMBER 23 L C C, The Horniman Museum, Forest Hill, S E 3 30 p m Miss I D Thornley, "Village Life in the Middle Ages"

Public Works, Roads and Transport Congress, at the Royal Agricultural Hall, Islington, N 11 a m Mr R Beveridge, "Costing as an Aid to Economy"

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NOTICES

NEXT WEEK

MONDAY, NOVEMBER 25th, at 8 p.m. (Cantor Lecture.) E. G. RICHARDSON, B A., Ph.D., D.Sc., Lecturer at University College, "Wind Instruments from Musical and Scientific Aspects." (Lecture II).

Demonstrations will be given on the various instruments.

WEDNESDAY, NOVEMBER 27th, at 8 p.m. (Ordinary Meeting). C. NORMAN KEMP, B.Sc., A.I.C., Secretary Royal Scottish Society of Arts, "The Examination of Coal and Coke by X-Rays" (Dr. Mann Lecture). DR. FRANK S. SINNATT, F.I.C., M.I.Min.E., will preside.

COUNCIL

A meeting of the Council was held on Monday, November 11th. Present:—Mr. Llewelyn B. Atkinson, M.I.E.E., in the Chair; Sir Charles H. Armstrong; Lord Bledisloe, P.C., K.B.E.; Sir D. T. Chadwick, C.S.I., C.I.E.; Sir Atul C. Chatterjee, K.C.I.E.; Captain Sir Arthur Clarke, K.B.E.; Mr. P. Morley Horder F.S.A.; Sir Herbert Jackson, K.B.E., F.R.S.; Major Sir Humphrey Leggett, R.E., D.S.O.; Sir Henry A. Miers, F.R.S.; Col. The Master of Sempill; Sir George Sutton, Bt.; Mr. Alan A. Campbell Swinton, F.R.S.; Mr. Carmichael Thomas, and Lt.-Col. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., with Mr. G. K Menzies (Secretary), and Mr. W. Perry (Assistant-Secretary).

The following candidates were duly elected Fellows of the Society.

Brady, Edward Mark, Dublin
de Sousa, Dr. Jose Inacio, Bombay, India
Goddard, George, Thurmaston, Leics.
Greaves, Mrs. Florence E., Southend-on-Sea
Hogg, Major Oliver Frederick, R.A., London

Laemmle, Carl, New York City, U.S.A.
Pickwoad, W. A., La Paz, Bolivia
Sanderson, D. C. D., Rangoon, Burma
Sharratt, Oswald Sewell, Hull
Shethia, J. D., Calcutta, India
Teng-Kwei, Cambridge, Mass., U.S.A.
Tizard, Henry Thomas, C.B., M.A., F.R.S., London

Mr. H. T. Tizard, C.B., F.R.S., was elected a member of the Council in place of Sir Thomas H. Holland, who resigned his seat on the Council on his appointment as Principal and Vice-Chancellor of the University of Edinburgh.

A sub-committee of the Council was appointed to deal with financial questions relating to West Wycombe. The Sub-Committee consists of the Chairman of the Council (Mr. L. B. Atkinson), the Chairman of the Executive Committee of the Fund for the Preservation of Ancient Cottages (Mr. P. Morley Horder), and one of the Treasurers, with power to add to their number.

Sir George Sutton was appointed Chairman of the Examinations Committee in place of Sir Philip Magnus, resigned.

The arrangements for the present Session were further considered.

A quantity of financial and formal business was transacted.

SECOND ORDINARY MEETING

WEDNESDAY, NOVEMBER 13th, 1929. CHARLES VERNON BOYS, F.R.S., in the Chair. A paper on "New Developments in Hydraulic Pneumatic Engineering" was read by Mr. J. O. Boving. The paper and discussion will be published in the *Journal* dated November 29th.

CANTOR LECTURES

MONDAY, NOVEMBER 18th, 1929. MR. E. G. RICHARDSON, B.A., Ph.D., D.Sc., delivered the first of his course of three lectures entitled "Wind Instruments from Musical and Scientific Aspects." The lectures will be published in the *Journal* during the Christmas recess.

PRESERVATION OF ANCIENT COTTAGES

WEST WYCOMBE

Thanks to the generosity of Lady Binning, the Council hope very soon to have a Guest House in West Wycombe, where Fellows and all interested in the experiment in educated control of an English village can obtain full information about the work and the ways in which they can help the cause.

ARLINGTON ROW, BIBURY

The work of reparation here is now practically complete, but there remains a small derelict cottage opposite Arlington Row, which looks sadly conspicuous and forlorn. Mr. Wykeham-Musgrave, from whom Arlington Row was acquired, has offered to hand this cottage over to the Society if it will be responsible for its repair. The Vicar of Bibury, who has taken much interest in the work, thinks there would be no difficulty in finding a single tenant for the cottage if it were made habitable. Six hundred pounds is needed to restore the cottage and to pay off the balance of the repairs to Arlington Row. The work done has proved so satisfactory that it is hoped some generous lover of the Cotswolds will help the Society to clear off the debt

TURKDEAN, SMARDEN, KENT

A question was asked in the House of Commons two years ago about this very typical Kentish yeoman's house, and the Society has been making strenuous efforts ever since then to see that its character should be preserved. They are glad to report that it is now in safe hands, and although its restoration may be a work of years, its owners are fully alive to the value of their property. The adjoining house is also in the same possession, so that the beautiful Kentish picture of houses grouped around the church is likely to remain unspoilt.

THE LEASOWES, HALESOWEN

The Secretary of the Shenstone Society, Mr. E. Edge, through the good offices of Mr. Harold Cox, appealed to the Royal Society of Arts to assist in the preservation of this once famous house and gardens. Shenstone ranked as a poet in a rather superficial age. Disraeli suggested that he should be remembered for better reasons. He says: "When we consider that Shenstone, in developing his fine pastoral ideas in the Leasowes, educated the nation into that taste for landscape gardening which has become the model of all Europe, this itself constitutes a claim on the gratitude of posterity. Thus the private pleasures of a man of genius may become at length those of a whole people."

A considerable correspondence was published in the *Birmingham Post*, and it is hoped that the property may be saved from becoming a building estate. We should like to appeal to any Fellows in the district to interest themselves in the matter, and suggest that the University of Birmingham might lend a hand in the good work.

When visiting Leasowes, the Society's representative took the opportunity of going over the town with the Vicar, who writes in his *Magazine*:—

OUR OLD COTTAGES

. . . . Mr. Horder is also the Chairman of a special body called " The Fund for the Preservation of Ancient Cottages," which has been formed by the Society of Arts to arouse interest in our old English Cottages and to endeavour to save them for posterity. He paid a very hurried visit, but he found time to look at those in our midst, and was horrified when I told him that it was seriously contemplated pulling down the pair by the Church Schools when an opportunity presented itself in order to improve the approach.

I am afraid I am guilty of having considered such an event, but I now make public repentance and see the error of my way ! After all as Mr. Horder says, these old houses do give an air of distinction to the town and surely are welcome to the eye if only as a relief from the " red rash " that is so terribly visible here and on the way to Birmingham. I agree, and when you come to think, it is rather absurd that we spend thousands of pounds on buying a picture or an old book to keep it in this country at a price greatly increased because the United States desire so greatly these objects of beauty and antiquity, but when bought not one in ten thousand of us will ever see them, while we treat as of no value buildings of beauty and eloquent of the past which can never be replaced, and are visible free of charge to all and sundry.

Mr. Horder did not have time to look carefully at any other of our old buildings, but I have always had a soft place in my heart for the Georgian and Queen Ann brick houses that still exist in Cornbow and are well worth preserving.

SUDBURY, SUFFOLK

Some interesting cottages in the main street have been saved through the energy of Mr. Basil Oliver, who represents the Society for the Protection of Ancient Buildings on the Royal Society of Arts Executive Committee. This is an admirable piece of work, especially when it is recalled that the American Ambassador recently visited the ancient town to receive the freedom of Sudbury.

PROCEEDINGS OF THE SOCIETY

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OPENING MEETING OF THE 176th SESSION

WEDNESDAY, NOVEMBER 6TH, 1929

MR. LLEWELYN B. ATKINSON, M.I.E.E., Assoc.M.Inst.C.E., Chairman of the Council, in the Chair.

The Chairman delivered the following address :

FIFTY YEARS OF ELECTRICAL SCIENCE AND INDUSTRY.

It is the duty each year for the Chairman of the Council of the Royal Society of Arts to address the members at the first meeting of the session, and as the Council and members have honoured me by electing me to this post, an honour which I deeply appreciate, I have given considerable thought to the question of the subject which should form the theme of my address. It is not unnatural that on becoming your Chairman I should have been led to look back at the picture in which the Royal Society of Arts presents itself to my mind, all my earlier recollections of it being as the forum at which were presented in papers at meetings and in Cantor Lectures the discoveries in and the principles of the practical applications of electrical science. I was, therefore, led to think that perhaps it would be useful if I were to survey in this address the fifty years since the birth of the modern electric era, and its growth during that period, since it so happens that I have been a personal witness of this growth. As the number of those, who like myself, have lived through this period of growth is sadly diminishing, a brief resumé with stress on the critical points of progress may have some use for those who will follow. The title I chose for the address was " Fifty Years of Electrical Science and Industry." Since this title was announced, my attention has been called to a book published by Professor, now Sir Ambrose, Fleming, entitled " Fifty Years of Electricity," and I have expressed to him my regret that I should have chosen a title so similar.

It is 2,500 years since Thales first observed the attraction of amber rubbed with silk upon small light particles of straw, etc., it is 320 years since Gilbert wrote his treatise " De Magnete," when for the first time some scientific record of the magnetism of the lodestone was recorded, it is 180 years since the first frictional electrical machine was made by Otto Von Guerich, of Leyden, it is just over the century since Volta discovered the Voltaic battery, and not until 1820 was the property of an electric current in a wire to produce magnetic effects discovered, whilst less than 100 years ago Faraday discovered the production of electric currents by the movement of conductors relatively to magnets or to other conductors carrying electric currents.

History of Inventions.

From this latter discovery sprang the series of inventions of machines for converting mechanical energy, first of the human muscles and then of steam engines into the energy of electric currents. Beginning with machines, in which coils were moved to and from the poles of permanent magnets termed magneto electric machines, the power was augmented by the use of electro magnets, these at first being energised from batteries and then from separate magneto electric machines and culminating in the practically simultaneous invention by Varley, by Wheatstone and by Siemens of the dynamo electric machine, in which the small initial magnetism of the iron of the machine produces at first a very weak current magnetising the magnets, which as their magnetism grows, reinforce this result till the magnets are fully energised.

It is remarkable to note that S. A. Varley filed a provisional specification for such a machine on December 24th, 1866, Dr. Werner Siemens, on January 17th, 1867, communicated the invention to the Academy of Science in Berlin, and on February 14th, in London, independent papers by Siemens and by Wheatstone were read, communicating the same discovery, whilst the first dynamo constructed, which was the Wheatstone machine, was there exhibited. Thereby was born the modern electric age, 62 years ago, within my lifetime. But something more was needed than these produced, for all these machines gave a more or less intermittent current, and it was not till 1871 that M. Gramme, of Paris, exhibited to the Academy of Sciences a dynamo electric machine with a continuously wound ring, which, sub-dividing the effect between a large number of successively acting coils, produced a substantially continuous current. The first use made of such dynamos and of the many others which followed was their use for running arc lamps, and as early as 1873 one was in use for running an arc lamp in the clock tower of the Houses of Parliament At this time, it was recognised that to one lamp one dynamo was necessary, besides which the single lights were too powerful for any purpose except large halls or open-air lighting, and the problem of the sub-division of the electric light was the insistent one for the electrical engineer of the time I well remember being in a cab in London with my father, it must have been about 1876 or 1877, when he told me that an inventor named Lontin had accomplished this. This Lontin did by using an alternating current machine having a number of fixed coils facing inwards on a ring, within which revolved electro-magnets excited by a separate machine, and the currents from the individual coils were taken to separate arc lamps, so now it became one *coil* to one lamp, each lamp being independent of the others. The earliest electric light in London streets was by such a system outside the old Gaiety Theatre in 1878.

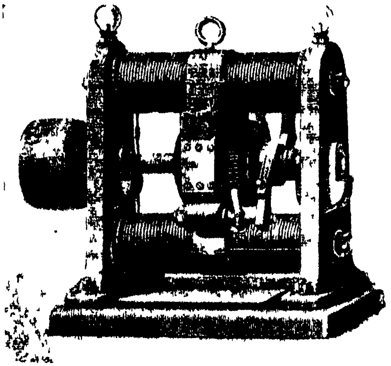


FIG. 1 - Gramme Dynamo

The first real move forward commercially, that is, other than a matter of scientific interest, was found in the Jablakoff candle invented by a Russian engineer in 1876, and consisting of two parallel carbons separated by a vaporisable insulator, between which the arc gradually burned down. This was introduced to the world at the Paris International Exhibition of 1878, and such was the popular interest and appreciation of the new lighting by electricity, that the way was paved for the Paris Electrical Exhibition of 1881. But, before I deal with that, I must refer to some other matters.

In the early part of 1878, R. E. Crompton had brought over from France a Gramme dynamo and Serrin arc lamp to light the casting pits at the Stanton Ironworks, and in that year he commenced the manufacture of electrical machines and arc lamps at Chelmsford, and here in a few years he established an important and successful business, building a modified type of dynamo, designed by a Swiss engineer Burgin, which was mechanically a great improvement on the Gramme machine, and by 1880 lighting of goods stations and out-of-door areas by arc lamps was being actively entered upon by his firm.

In 1880-1881 the City of London was the scene of some wonderful experiments in electric lighting. A system of electric lighting devised by Charles Brush of Cleveland, America, and which had already been in use for a year or two in America, was introduced here. In contra distinction to the solution of the problem of sub-division of the electric light which I have already described, and which depended on the use of separate machines or coils, or separate circuits to each lamp, Brush placed all his lamps in series so that the same current traversed each. The regulation of the length of the arc of the lamp, which hitherto had been by a magnet operated by the current supplied to the lamp, so that as the length of the arc increased and so diminished the current the feeding mechanism was released, was in the Brush lamp effected by a magnet of high resistance shunting the lamp, so that as the length of the arc increased the shunted current increased and the magnet released the feed mechanism.

Crompton had modified the original Serrin lamp in the same manner, and at this time was running about six lamps in series, but Brush had succeeded in lighting as many as 40 lights in series, the possibility of doing this arising from the use of a different type of dynamo, which owing to its construction automatically maintained a constant current, whilst at the same time the system of commutation permitted voltages of 2,000 and over, without danger of flashing over. I think that the remarkable properties of this dynamo have not been fully recognized by modern electrical engineers.

Besides this system, part of the city was lighted by arc lamps on very tall masts, worked from Siemens' dynamos, one to each lamp, whilst in addition the Embankment was lighted by Jablakoff candles. This exhibition of electric light, vastly excited the public and determined my father and myself that I should be trained as an electrical engineer. But before all this happened another method of solving the problem of sub-division was being explored.

In the forties more than one inventor had had the idea of producing light by the heating effect of the electric current and more than one had suggested or experimentally tried to utilise carbon as the element to be heated, the carbon being in an air-free globe to avoid oxidation. Joseph Wilson Swan, in 1848, knowing of some of these experiments, had himself experimented, and by 1855 had produced suitable carbon spirals, but at that time batteries had to be used; the dynamo as the source of electric current was not available. But after the production of the Gramme machine, Swan resumed his work, and in December, 1878, he exhibited at a lecture at Newcastle-on-Tyne, a lamp with carbon filament in vacuo. Edison, working in America, had, in 1878, attacked the problem of sub-division, and, in December, 1878, had announced that he had solved the problem. His solution at that time was a lamp with a platinum spiral and a regulating device to prevent over-heating. In November, 1879, nearly a year after Swan's exhibition of carbon lamps, Edison applied for a British Patent for a carbon lamp and it was granted to him. It is on this fact that the American claim that Edison invented the practical incandescent lamp is based, but it is recognised by all competent to judge that he was preceded by Swan.

In 1880 Swan was producing these lamps in reasonable quantities, and in that year exhibited them at a lighting exhibition organised in Glasgow by the gas interests.

In the Electrical Exhibition held in Paris in 1881, and the Electrical Exhibition held in London in 1882, lamps of Edison and of Swan make were shown, and others by Lane Fox and Maxim, and the result on the minds of engineers, the public and the financial world was instantaneous. New dynamos, new lamps, both arc and incandescent, were produced on every hand, gas shares were almost thrown away, the wildest financial schemes were promoted, large sums of money passed from the public pockets to those of inventors and financiers. But, nevertheless, the real work of creating an electric lighting industry remained to be done, for at this stage nothing but lighting was envisaged. In 1882 came the first electric lighting bill, to which I shall refer later. It is difficult for electrical engineers to-day to envisage the difficulties which electrical engineers had to contend with. Up to 1881 measurements of electric current were generally made with a tangent galvanometer, an instrument only fitted for a laboratory, or a Siemens' dynamometer. Each of these were used because they had "a law," that is, if the constant was determined for one point, the value of the readings at other points was known. Voltages were measured by high resistance galvanometers, sometimes with scales and sometimes by null methods and mirror galvanometers. All these instruments had weak controls and so were very slow in reading. About 1881 Professors Ayrton and Perry introduced a series of direct reading dead beat ammeters and voltmeters; they were still obsessed by the idea of a law and the soft iron needles of these instruments were of carefully ascertained shape, so that the value of the reading was directly proportional to the current. Other direct reading instruments followed, and the idea was at last realised, that a law was unimportant and that the instruments could be calibrated right through the scale and the dial marked to correspond. From this time onwards the advance of the new science was accelerated by the ease with which electrical measurements could be made. In 1883 Gaulard and Gibbs made a demonstration on the Metropolitan Railway, and also exhibited at the Aquarium, London, their transformer which enabled the pressure of an alternating electric current to be raised or lowered, with accompanying inverse change of the quantity of the current. The idea involved had occurred to several inventors, but ignorance of the principles underlying the design of such apparatus had prevented success. Gaulard and Gibbs laid down the principle that the two sets of coils between which the transformation was to take place, must lie one within the other, in other words, all the magnetic change in the iron core must equally affect each coil; as we should say to-day, there must be no magnetic leakage between the two sets of coils. They arranged the primary or high voltage circuits of all their transformers in series and supplied these with a constant current. The effect was a tendency for there to be a constant current in the secondary or low voltage circuit. Had the lamps been in series on the low voltage circuit, it would have been possible to turn these in and out singly without affecting the rest of the lamps, but as the lamps were arrayed in parallel the whole number had to be in use, otherwise the pressure rose and broke the lamps.

By 1885 it had been realised that if instead of a constant current supplied to the primary of a transformer, giving rise to an approximate constant current in the secondary, a constant voltage was applied to the primary, an approximately constant voltage would be developed by the secondary. On this principle a demonstration was made in London in 1885 and tests made by Professor (now Sir Ambrose) Fleming, demonstrated the complete independence of the transformers and of the lamps on the secondaries and that the transformation efficiency was as high as 92 per cent. From then onwards, the high pressure system of distribution took its place. It was strongly opposed by many engineers on the ground that it was not possible to use accumulators, that the alternating current dynamo could not be run in parallel, and that it was not possible to distribute motive power, as alternating current motors did not exist.

The first objection stands good, but the growth of systems of alternating current distribution has justified the provision of spare running plant instead of accumulators, as the safeguard against failure, of supply. The motive power question was shortly solved as I shall mention directly, whilst in 1883 Dr. John Hopkinson demonstrated theoretically that alternating current generators would run in parallel and could be used to transmit power, a fact proved experimentally by Professor Grylls Adams in 1884, using two De Meritens alternators at the South Foreland lighthouse. Mr. Henry Wilde had discovered this in 1868, but his paper on the subject "Synchronous rotation of armatures of number of electro magnetic induction machines" had been overlooked or forgotten.

Between the years 1886 and 1891 very intense study was given to the principles underlying the design of electrical generating plant, dynamos, alternators, motors, and transformers and to methods of calculating their design, and some remarkable papers were published, some of which I must mention. In 1886 Dr. John and Dr. Edward Hopkinson presented a paper to the Royal Society and almost simultaneously Dr. Kapp to the Institute of Electrical Engineers, in both of which the hitherto baffling problem of how to design the electro-magnet system of a dynamo was treated in a comparatively simple manner by introducing the conception of a magnetic circuit in which the magnetising coils gave a magneto motive force, the iron and the air space had each a magnetic resistance or reluctance, and the magnetic induction or number of lines of magnetic force was the quotient of the magneto motive force by the reluctance. It was shown that by the use of this idea with corrections for the fact that part of the magnetic circuit was outside of the iron of the armature (leakage) if the magnetic properties of a given sample of iron were known, the accurate pre-determination of the electro-magnetic system was possible. It is difficult for engineers to-day to realise what an astonishing revelation this was for designers.

Another very important addition to the methods of calculation as applied to alternating currents was introduced by Professor Blakesley in a series of papers he contributed to the "Electrician" about 1883, and which were published in book form in 1885. His method was a graphical one, in which the electro motive force, current, or magnetic induction, were treated as pure harmonic or sine functions. By representing each of these, or several of them in different phases by lines whose lengths were proportional to their magnitude, and whose phases were represented by their relative angular position, and which were considered as revolving on one end in the plan of the paper as a pivot, it followed that the projection upon an axis passing through the centre or pivot represented at each moment the magnitude (positive or negative) of such function, and hence enabled calculations to be graphically performed, which would require rather cumbrous formulation in terms of trigonometry and algebra. Blakesley himself, using this notation gave the solution of a number of problems connected with circuits containing inductance and capacitance and of transmission of power by alternators. In the hands of engineers like Kapp, Silvanus Thompson and others, this method proved very fruitful and undoubtedly contributed greatly to the advance of alternating current theory and working.

With the solution of the problem of the magnetic circuit and with the graphical method of calculation for alternating current work an era of rapid evolution of design took place, and in this relation I will mention four papers read before the Institute of Electrical Engineers, each of which in a way was a landmark in Electrical Engineering. The first was a paper by Kapp in 1888, on Electrical Transformers, in which the theory and method of calculation were developed in a manner that really completed the subject. In particular, a very simple conception for the calculation by the circle or vector diagram introduced by Blakesley was given, in which the fundamental variable was not the impressed primary E.M.F. but the magnetic flux.

Then in February, 1890, James Swinburne gave a paper on Armature Reactions, in which he developed the effects of the current in the armature of a dynamo generator, and showed how these effects which are detrimental might be partly or wholly overcome, and this paper made the suggestion of the use of reversing pole pieces in direct current generators or motors, a practice which, overlooked at the time, by 1900 had become universal.

In May, 1889, Mr. Mordey read a paper on Alternating Current Working, in which he described a series of remarkable experiments on the parallel working of Alternators and the transmission of power by their use, and in which he contended that he had disproved the theory of Hopkinson already referred to, though it was shown in the discussion that he had amply proved its correctness.

Finally, I will refer to a paper by W. B. E son, given in April, 1891, on multipolar dynamos, giving a strong lead in the direction which shortly afterwards became the universal practice. The nett result of these papers was to put the engineering design of dynamo electric machinery on a firm footing; really very little of a fundamental nature has since been added.

Meantime, the drawback to the use of alternating currents, viz., that electric motors were not available for power transmission, except in the case of large units when the synchronised generator and motor, already referred to, could be used, had led to invention being concentrated upon this problem. Almost simultaneously Professor Ferraris in Italy, Dobrowolski in Budapest, and Nikola Tesla in America, found a solution in the supply of alternating currents, whose phases differed either by a quarter period or by one-third of a period. The simple explanation given, which is approximately correct, is that by winding coils on a ring of iron connected to these differing phases, so that the maximum magnetic effect passes in turn round the ring, there is produced a rotating magnetic field, and if a body of conductors are placed on an iron core so that this rotating magnetic field passes over it, electric currents are produced in such directions as to be acted upon by the magnetic field, so that the iron core with its conductors tends to move in the same direction and with nearly the same angular velocity as the rotating field. In 1891 there was an electrical exhibition at Frankfort-on-Maine, which I visited, and there was exhibited a three-phase motor of 100 h.p., to which power was being transmitted at 8,500 volts pressure from a fall on the River Neckar more than 100 miles away. From that moment the motor difficulty was recognised as being solved.

Though, strictly speaking, the development of the steam engine is not part of the subject upon which I am addressing you, yet, nevertheless, the progress of the steam engine has been so connected with and conditioned by the generation of electricity and *vice versa*, that I will say a few words thereon.

At the commencement of our story, steam engines in large sizes were slow running, 60 to 100 revs. per minute, having two or three cylinders, through which the steam was expanded before reaching the condenser. Generally, for land purposes, it was a horizontal engine, for marine purposes vertical, the valves were, as a rule, slide valves, moved by eccentrics on the main shaft.

About this period, however, engines with separately lifting valves, for the inlet and outlet of steam, were being introduced, the valves being operated by cams, which enabled a much better cycle of steam entrance and exhaust to be accomplished. With such engines and with the high speed at which dynamos had to be run, pulley and belt transmission was a necessity. Then began a period of experiment, directed on the one side to increase the speed of the engine, and on the other, to produce dynamos efficient at lower speeds. Among an enormous number of engines of varying type, an engine which had been invented by Peter Willans for river launch work, first used, I believe, directly coupled to a dynamo by Col. Crompton, achieved a marked success. The fundamental principle of the engine may be thus described. The cylinders, two or three, depending on whether the steam pressure justified a compound or triple expansion engine, were mounted in tandem on a single line of cylinders. The engine was single-acting and the steam from a cylinder on one line of piston exhausted into a cylinder of larger diameter on another line. In order to maintain the connecting rod pressure always in a downward direction upon the crank and so prevent hammering, each line of pistons had an air buffer cylinder in which air was compressed on the upward or idle stroke. This engine ran perfectly silently at speeds of 1,000 to 1,500 revs. per minute, it was very economical of steam and so far as engines up to 1,000 h.p. or a little over were concerned, it entirely solved the problem. The valves were of the piston type and worked in the centre of the line of pistons operated by an eccentric between two connecting rods. Above about 1,000 h.p., difficulties were experienced with the operation of this central valve, so there came a time when the development of electric generation went ahead of this remarkably successful machine. Meantime, as early as 1885, at the Inventions Exhibition in London, the Hon. Charles Parsons exhibited a dynamo driven direct by an engine, in which the steam passed through alternate fixed and moving blades after the manner of a water turbine, and enabling a speed of as much as 15,000 revs. per minute to be obtained. There were many ingenious devices to enable the rotating part to revolve about its own dynamic centre of mass and so to work without vibration. It is true the steam consumption was very high, up to about 20 lbs. per h.p. hour, largely due to leakage between the revolving part and the casing, but the small size of the whole machine for a given output made its progress rapid. Through varying stages the steam turbine has marched to success, until to-day it has become well-nigh the universal engine for large power of any kind, and for electrical generation has practically no rival.

I have dealt at considerable length with the developments of dynamo electric machinery, because I was personally more especially interested in this side of the subject during the eighties, but I ought also to indicate developments in the distribution of electricity by cables. It is well known that in other countries, both America and the Continent, all the earlier developments were made by overhead wires, but in this country there has always been the strongest opposition to these.

At the commencement of the era of power and light distribution, Edison had invented a cable distribution system, consisting of two copper bars semi-circular in section, the flat sides facing and insulated from one another, insulated over all and fixed in lengths in iron pipes with junction boxes allowing service wires or mains to be tapped off. The system was workable, but costly to lay, and the number of joints a great drawback. Col. Crompton, in 1886, had devised a system whereby in a conduit under the road, bare copper conductors were supported on glass or porcelain insulators with straining fixtures at intervals. This system modified was used by other London Companies, but although the original system is still working in Kensington, it has in general been replaced by cables. The earliest insulated cables used in houses and also in streets were rubber insulated, a natural development from the gutta percha insulated cables, used for telegraphic underground work, and for deep sea cable insulation. But whilst rubber insulated cables work well for interior wiring, they deteriorated very rapidly when drawn into iron pipes underground alternately dry and moist from condensation from the air. In 1888, when Ferranti was laying out his great Deptford station, which was to supply London by current, brought from Deptford at the then unheard of pressure of 10,000 volts, he designed a system of conductors in which an inner hollow tube was insulated by being wound over with paper, dried and impregnated with tarry matters. This insulated inner tube was placed in another copper tube, which was drawn tight over it. These two, with a further bedding of paper, were placed into an iron tube, which was then drawn down tight onto it. By an ingenious system of mechanical joints the inner and outer tubes were forced mechanically into very intimate electric contact. Mains on the system have been in use for about 39 years, at 10,000 volts, giving practically no trouble whatever. But, obviously, the use of paper as an insulator in this way was only possible for a rigid conductor system laid in lengths of about 20 feet. In 1892, J. B. Atherton brought from America the process of making insulated cables by wrapping the cores with paper strips with overlapping joints and impregnating the paper with insulating oil and covering the whole in continous lengths with a lead pipe. The British Insulated Cable Co., Ltd., was formed in the same year to manufacture such cables, which from that time onwards became increasingly recognised as the best form for underground cables. The Callender Cable Co. introduced about the same time a system of cables insulated with a compound in which Trinidad bitumen was originally used and subsequently bitumen mixed with by-product oils, and vulcanised, which had a very wide use, though to-day, except for mining purposes, this type of cable is falling out of use. The paper-insulated cables referred to are made in a variety of types, for single feeder circuits, concentric, that is, one central conductor, with a layer of wire surrounding and insulated from the central core, for three-wire systems, two cores of equal area and one smaller as the so-called neutral wire, three equal cores for three-phase work, and so on. The pressure at which such cables have been worked, have, until recent years, ranged up to 11,000 volt. Then experiments were carried out with their use up to 22,000 volts, latterly, that is in the course of the last few years, 33,000 volts have become not uncommon. Certain difficulties have occurred in some cases, with those latter, particularly after they have been laid some time, partly due to mechanical distortions occurring in laying cables of large diameter with considerable thicknesses of paper, and partly due to new joints problems. These have been in the main eliminated. For 33,000 volts and over it has become common practice to use three single-core cables, or its equivalent three insulated cores each covered with a thin metal covering or coating of metallised paper, these being finally enclosed in a lead sheath (the Hochstader cable). Experimental lengths are now in use and being laid of another type of cable where provision is made for restoring to the cable (which has a hollow core), on cooling, the impregnating oils which have been forced

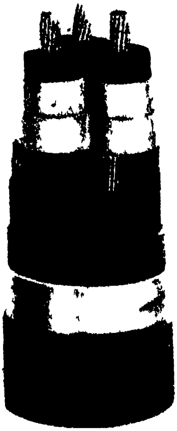


FIG 2.- 3-Phase Paper Insulated High Tension Cable, with Pilot Wires.

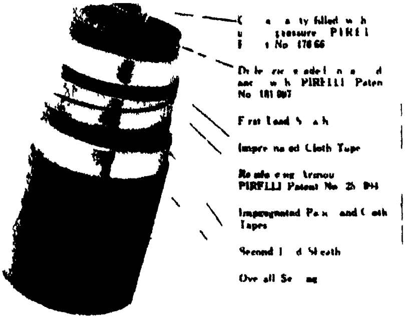


FIG 3—Single Hollow Cored Cable for working under Oil **Pressure.**

out by the expansion of the oil and thus the formation of air spaces is prevented (Emanueli cable) The use of oil under pressure passing up the hollow core was patented by Ferranti in 1888 Thus gradually the working pressure of cables has been raised from the 10 000 volt cable of Ferranti in 1888 to the 66 000 volt and 132 000 volt cable of to day Higher pressures still are under consideration and study in the laboratories For internal wiring of buildings except for special purposes india rubber or special compounds largely composed of india rubber hold the field being generally carried through tubing or protected by lead covering or with thick rubber of special mechanical strength

CENTRAL STATION SUPPLY OF ELECTRICITY

I must now devote a few words to the initiation and realization of the Central Station for the Supply of Electricity In 1882 Edison who in 1880 had realized the requirements of Central Station supply that is large engines

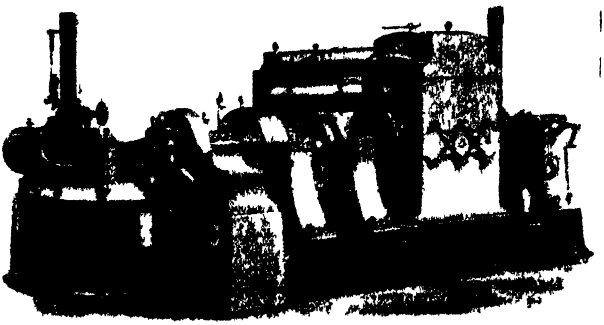


FIG 4—Combined Engine and Dynamo Edison's First London Central **Station.**

and dynamos, very low resistance street mains and high resistance lamps in parallel, established on Holborn Viaduct a Central Station, with direct coupled 150 h.p. engine, supplying through mains laid in the street some 1,500 carbon lamps of 16 c.p. each, but the real Central Station lighting of London dates from 1886. In this year, Col. Crompton had completed an electric Central Station in Vienna, capable of working on full load up to 1,000 kilowatts, and at the same time had founded a Central Station in Kensington Court—a new residential area then just built—where with the help of an underground conduit running under many of the houses bare conductors on insulators could be run giving connections to the houses. The supply was by continuous current, generated by direct coupled Willans Crompton dynamos, giving 220 volts; the house supply on three-wire system with accumulators, giving 100 volts to the customers. Thus in London was the direct current supply inaugurated.

In the same year Sir Coutts Lindsay had started to supply certain customers in the West End from the electric lighting installation at the Grosvenor Gallery, the distribution being by Gaulard and Gibbs' transformers in series, as already described.

FIG. 5.—Ferranti Plant at Grosvenor Gallery, London.

In 1886 Mr. Ferranti (now Dr. Ferranti) was appointed engineer to the station and after some months of struggle with transformers in series, Ferranti advised that the customers should be supplied from transformers in parallel, as was done late in 1886, and from that moment success was assured, and in 1887 over 27,000 lights to 280 customers were being supplied.

In 1887 the plan of the great station at Deptford was completed, and in April, 1888, the machinery was put in hand, and by October, 1889, supply was given at high pressure, 10,000 volts to transformer stations in London—where the pressure was reduced—the prototype of every modern station.

From 1905 the carbon lamp which required about 4 watts for each candle power began to be replaced by other types, employing first the metal osmium, then tantalum, and finally, tungsten in the form of rods or wire for the filament. These metals enabled much higher temperature to be used with greater luminous power for a given consumption, the tungsten lamp giving 1 candle power for 1 watt, and in special forms with a slight internal pressure, due to an inert gas, such as nitrogen or argon, one 1 candle power for ½ watt. These new lamps gave a great impulse to electric lighting, which thus became as economical as any other form of illuminant.

Reference must also be made to some happenings which have greatly influenced Central Station working. The first of these to which I will refer was the remarkable paper by Crompton, read before the Institution of Civil Engineers in 1891, in which for the first time the economics of electric power generation were set out, and in which the great importance of what for the first time was called load factor, was set out. In that paper he set out figures of cost of electricity which he believed possible, which at the time were considered almost fantastic, but which have been beaten to-day.

The next item which left a lasting impress on the Industry was the Presidential Address given by Ferranti to the Institution of Electrical Engineers in 1911, in which he showed the advantage of the Universal distribution and use of electric power, a theme he has never ceased to expound.

The third matter, which has had an extraordinary influence for good, has been the publication month by month in the journal known originally as *Lightning*, and for many years now as the *Electrical Times*, of a table showing the production and distribution costs of electricity in all the London and provincial systems. The information given and the rivalry set up has been a strong impelling force for low costs. This feature was originated by Robert Hammond, writing under the nom de plume of "Chesterfield Junior."

The last item to which I will refer was the great increase of the use of electricity industrially after the war due to the great increase in the price of coal. I had long preached that the one thing necessary for increasing the use of electricity in Great Britain was a high price of coal, due to the fact that in isolated power plants coal is the heaviest item of cost, in electrical production and distribution it is secondary.

These four items have all co-operated to greatly stimulate the use of electricity in this country.

TELEGRAPHY, TELEPHONY, WIRELESS COMMUNICATION.

I have not spoken of the application of electricity to telegraphy, telephony, and to wireless communication, nor can I draw to the same extent on my own personal experience, as in these branches of the industry I have only been a looker-on, but a few words as to the salient points may be noted.

The first telephone I ever heard was a pair of magneto instruments, made I think in 1876, by the father of one of my schoolfellows, before such were available generally, from a description which appeared in the *English Mechanic*, and I gave a lecture at school on the telephone in the year 1881, when they were first beginning to come into use. In 1879 an exchange was started in Glasgow among the medical men, and in 1879, later in the year, the first exchange was started in London with 12 subscribers. It is very remarkable that except in detail, the original carbon microphone transmitter and the permanent magnet and coil receiver have not been altered. But the exchange plant has altered, of course, out of all recognition, particularly with the coming of the automatic exchanges. The original exchange system in London and England belonged to the National Telephone Co., and there were a few cities with their own local exchange systems. The only one of the local systems left is, I believe, Hull, since the Government took over the whole of the National system in 1911, having already constructed and been the owners of the trunk or long distance lines.

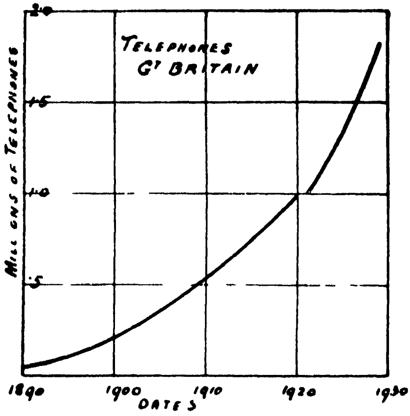


FIG. 6 - Diagram shewing growth of Telephones in Great Britain.

The greatest developments in telephony since the early eighties have been due to improvements in line construction and methods of working. Oliver Heaviside in the eighties had pointed out the requirements of a telephone line for perfect transmission of speech, but no use was made of his theoretical solutions, which involved artificially increasing the self induction of the line. Pupin in America, in 1899 developed the theory, and by putting self induction coils at mathematically determined intervals on the line, enabled very great distances to be covered. The use of these coils has not proved of great advantage on land lines in England, where the distances are shorter. But the bulk of telephone lines to-day are laid underground and the use of self induction coils on underground lines —referred to as loading coils—has led to great perfection in speech transmission. In addition, the invention of the electron valve—which I refer to later—has enabled the circuit to be divided, and the weakened current to be reinforced at repeater stations, as they are called. So that in England the circuits which required conductors weighing 200 lbs. per mile are now equally efficient with conductors weighing 20-40 lbs. per mile. Telephone subscribers over the whole world now are, or in a few months will be, in touch telephonically with one another- a result very largely due to British skill and initiative.

The curve of growth of telephone subscribers shows that the number of telephone subscribers in this country doubles about every ten years. This country, however, stands badly in the matter of number of telephones per head of the population, and in some quarters it is considered that this will not be overcome until the Telephone Service becomes an independent unit, managed on purely commercial lines, without the implications involved in its finances being conditioned by treasury requirements or necessities, or its personnel being Civil Service officials.

The story of wireless telegraphy begins with the discoveries in theory by Maxwell in 1864, and in practice by Hertz in 1888, of the transmission of electro-magnetic impulses independently of wires. In 1887 Sir Oliver Lodge had achieved wave telegraphy by wire, and for short distance across space, but in 1896 Senator Marconi came to England and interested Mr. Preece, the Chief Engineer of the Post Office, in a method he had invented of extending the distance to which wireless signals could be transmitted. Substantially his improvements consisted in using much longer wave lengths then Hertz had done, using a vertical wire or aerial, as we call it, with an earth connection as transmitter, together with improved forms of receiver for electro-magnetic waves

The first successful transmission over any considerable distance was made between Lavernock Point and the Flatholm Island on the Bristol Channel. Step by step Marconi developed his system. Improvements in detail and in the applied power led him to the point where transmission of signals across the Atlantic were possible.

A very important step was made in 1904, when Prof. (now Sir Ambrose Fleming), applied a long forgotten experiment of Edison (in which he showed that a current passed between the incandescent carbon filament of a lamp to a metal plate sealed into the globe but not in the reverse direction) to the production of a current rectifier, to enable the oscillating current from a wireless transmission to be converted into an unidirectional current, and so be used with a telephone as a signal detector. Shortly before the War, Dr. Lee de Forest invented a modification of the Fleming valve, by arranging between the hot filament and the positive plate a spiral or grid, as it is called, which could be independently electrified, and by suitably proportioning the electrification of this grid, the smallest change in its electric charge produces a much greater change in the electron stream from the hot filament. This modified Fleming valve acts as an amplifier. It is by the use of such amplifiers that signals of extraordinarily small intensity can be magnified practically indefinitely. Sir Oliver Lodge, in 1907, had pointed out the desirability of tuning the receiving apparatus so as to be in electrical response or resonance with the transmitter, and by applying this principle not only is the receiver made more sensitive, but it enables a receiver to receive one wave length, or speed of oscillation, to the exclusion of others, and hence many transmitting stations can work at the same time without interference. The tuned receiver with the detector and amplifying valve have made wireless telephony and broadcasting possible.

ELECTRIC THEORY.

A review of the progress of Electrical theory in the period under review is in itself a story that would fill a course of lectures, and so can only in this address be taken in summary. The first actions to which attention has been drawn and measurements made were those known as electrostatic, attractions and repulsions between bodies which had been subjected to friction, and to explain these actions a theory had been formed that they were due to two fluids, which though ordinarily mixed could be separated. Then it was suggested that one fluid in excess or deficiency would account for the actions, in either case it being assumed that the action between the so-called electrified bodies took place at a distance with no intervening mechanism. When Ampère had discovered the attraction and repulsions between conductors carrying electric currents, he formulated " laws " which explained in a similar way the action of each elementary unit of the electric circuit acting on every other unit, at a distance. Faraday had never been happy with the idea of action at a distance; in his mind's eye he always saw something in the way of a connection across the intervening place, " lines of force " he called them, strings or rods as it were, in tension or compression, and this idea guided him in the experiments he made, which led, step by step, to his great discoveries. The mathematician of the 19th century up to about 1860 had worked upon the laws of electricity, entirely from the point of view of " forces " connected with units of electricity or of units of electric current acting across an intervening empty space. Such forces depending on inverse distance laws, had explained all observed phenomena from a mathematical point of view.

In 1864, James Clerk Maxwell presented a paper to the Royal Society on " A dynamical theory of the electro-magnetic field, in which he reduced all the observed phenomena to the results which would arise in a medium capable of transmitting stresses and strains and capable of rotational energy. The most strikingly novel part of this theory was the implication that during the period when a charge is being given to a condenser, that is, to an arrangement of two conductors separated by a dielectric, there is a movement of electricity in the dielectric, a displacement current as he called it. Following upon this, Maxwell, considering an electro-magnetic charge at a given point, developed equations for the condition for another point at a distance and showed that the solution of the equations leads to the result, that the condition of things at a distant point depends on that of the initial point at a previous interval of time, the interval being that during which a light wave would have crossed the intervening space. I need not here proceed further with the demonstration he gave, that if light is a propagation of energy by the disturbance of a medium, light might itself be an electro magnetic disturbance, and probably is so.

James Clerk Maxwell, in 1873, published his treatise on "Electricity and Magnetism," in which he developed these ideas, and taking Faraday's experimental researches as his foundation, he built up a theory of electrical actions dependent on the dynamical action of something filling all space on which matter could act, and he showed that if this something which he called the ether were a sort of continuous sub-matter having inertia and elasticity, all the actions which we call electrical, could be stated in terms of tensions and compressions of the *ether* or of its rotation. He further visualised and demonstrated that such actions are not instantaneous as was assumed in the action at a distant theory, but required time to develop, the effects proceeding from point to point, as happens in a wave motion, and that the velocity of propagation calculated from the electric and magnetic constants of space or of the ether was the same as the measured velocity of radiant transmission of light or heat, from which fact he propounded the theory that light and heat were electro-magnetic phenomena.

These views were in a short time accepted by British scientists and electricians, but were not received well on the Continent, where among the mathematical physicists the theory of action at a distance was accepted as philosophically more reasonable than transmission by a medium.

Maxwell himself never attempted experimentally the demonstration of the existence of electromagnetic waves, but Sir Oliver Lodge, about 1888, produced waves in wires by the discharge of a Leyden jar under conditions such that the discharge was oscillatory, and in 1888 H. R. Hertz announced his discovery that he had succeeded in so arranging the discharge of a condenser of small capacity, that ether waves which could be detected by a looped conductor with a microscopic spark gap were produced, and that they exhibited the phenomena of reflexion and refraction similar to light waves. Maxwell's theory so far was justified. It is on this discovery that wireless telegraphy and telephony is based. But whilst this showed the propagation of electro-magnetic actions, it brought no nearer the solution of the question what is electricity?

In a long series of researches on electrical discharges in vacuo in the 70's and 80's, Sir William Crookes had observed that in a very highly exhausted tube, through which at high voltages a current was forced, there appeared a stream of light taking a straight line, but deflected by a magnet. He considered that such a stream was composed of matter in a "fourth state," the others being gases, liquids, solids. About 1896, Sir J. J. Thomson announced his discovery that the rays in a Crookes' tube are indeed caused by masses smaller than the smallest chemical atom and of a mass about 1/1800 that of a hydrogen atom, which he called corpuscles.

Not long afterwards Becquerel discovered that the element uranium gave off something which passed through opaque substances and blackened a photographic plate, and this observation led to the discovery of radium, the atoms of which are always disintegrating by stages, and which at certain stages of their disintegration give off masses having the same characteristics as the corpuscles of Thomson. The details of the process of disintegration of Radium were worked out in a wonderful series of researches by Sir Ernest Rutherford and F. R. Soddy, and these and other workers established definitely that these corpuscles are, in fact, the parts of what we call electricity and so were named electrons.

It was demonstrated by Rutherford that atoms of matter are composed of a nucleus in which most of the weight is concentrated and certainly in part made of electrons, and with which other electrons are associated.

As a mental image to enable some visualisation of the atom to be formed, we have had the Rutherford-Bohr atom so called after its proposers, in which a central nucleus or " proton " is surrounded by electrons circulating like planets round a sun. Such a visualisation clears many points, but always we are pushed back further. What is an electron, what is the nucleus or proton ? That is where the physicists now halt. Tentative mathematical studies and some very remarkable experiments point to the possibility that an electron is itself a particular point in a system of waves Discussion of this is outside of my present scope, but the mention will suffice to summarise the change in thought that has taken place from the time of Faraday and over the period of 50 years. Whatever may be discovered in the future as to the nature of the electron and the atom, nothing will alter the discovered fact, that electricity is composed of discrete entities, or electrons and that matter is largely composed of electrons. Nothing will alter the fact that all radiation, whether light heat or wireless waves is a phenomenon electromagnetic in character.

COMMERCIAL AND FINANCIAL PROGRESS OF ELECTRICITY.

Having touched upon the high lights of the picture of the development of electricity technically and scientifically, I now propose to deal with the commercial and financial side of the half century and growth. There are two separate sides to this, one is the growth of the constructional and manufacturing activity, the other the growth of public service in supply of electricity, in transport, and in communication as illustrated by the telephone. Each of these subjects would easily occupy an evening's lecture to itself, and hence, what I have to bring before you will be necessarily only a brief review. In what I shall be showing you, I have had very kind and able assistance in compiling the statistics from Mr. Hugh Quigley, well known for his industrial studies and his statistical knowledge of the electricity industry. The figures and curves must be taken as representing very careful estimates drawn from a variety of sources public and private, and involving certain allowances and connections which are known to exist, but of which the exact amounts are not determinable. The data on which these figures are based do not go back further than the early years of this century so that we practically have no data covering the first 15 years of our period.

The electrical manufacturing industry in its early days was composed of a considerable number of small or moderate sized firms; this was natural, they were the concerns formed to exploit the special products of individual inventors, then as the industry grew older the longer established engineering concerns formed departments for electrical work. Above all, the manufacturing industry in Great Britain has seen the establishment here of manufacturing business based upon foreign manufacturing experience, and in some cases foreign capital, such as the Siemens Bros., originally co-operating with Siemens Halske, Berlin, the Brush Electrical Engineering Co., founded to manufacture Brush arc light plant, but capitalised in this country, The British Thomson Houston Co., founded to work the inventions of Professor Elihu Thomson, The Westinghouse Co., Manchester, founded to work the inventions and processes of the Westinghouse Co., Pittsburg, America, with partly British and partly American capital.

The Cable Making Industry relative to light and power cables was principally at first using india rubber as an insulator, and was naturally grafted on the important submarine cable making industry (which had used rubber and gutta percha) existing on the banks of the Thames, where it had originated owing to the facilities for delivering cable in long lengths direct into the hold of the ships which were to lay them Here again new firms appeared such as the Callender Cable Co., who were formed to exploit a bitumen insulated cable, and the British Insulated founded to manufacture paper insulated cables, with lead covering. Alongside of these have grown up entirely new firms, often fostered by Government Departments, who desire to augment the competitive sources of supply on which they can draw.

In considering the public supply and traction sections of the industry, as well as the telegraph and telephone, we have to realize that these do not represent natural commercial growths, but the growths of monopolies under state control. Let us review the action of the state in 1880-1, the period when public lighting by electricity was about to develop Joseph Chamberlain, who had had a great experience in Birmingham of Municipal activities, was anxious as far as possible that the future of electric supply should be in the hands of the municipalities, as gas and water were coming to be at that time. Recognising, however, that there was a pioneering stage to be got over, he, then President of the Board of Trade, brought in and passed the first Electric Lighting Act of

1882, which provided for the granting of powers to set up central supply stations, with powers to break up streets, and to make and collect charges, but on the basis that at the end of 21 years the local authority could take over the concern, without any consideration for the goodwill, which 21 years of pioneering and establishing of a business would have created. The result was that for the most part the industry was strangled, there being no possibility of capital being invested on these terms, and whatever central stations were constructed at that time was by the use of privately acquired wayleaves and overhead connections. By 1888, it was recognised by everyone that the Act had strangled electrical development, and by an Act of that year, the period for purchase was extended to 42 years, with the result that considerable activity in electric lighting supply companies commenced, whilst Municipalities also by this time felt that sufficient experience was available to justify their entering the field as the electric supply authority.

Both these Acts of Parliament were marred by the underlying idea that the supply of electricity should be localized, that is, confined to a municipal or some other definite area, or a limited area in a great City like London. In 1919, a committee was appointed to report on certain Bills before Parliament, known as Power Co. Bills, whose aim was to create generating stations to supply in bulk and to large industrial users, over wide areas containing many local authorities, and as a result Acts were passed giving such powers, strictly limiting the entrance of the mains of such companies into the areas of municipalities, already exercising electric generating powers. Notwithstanding this limitation, such Companies have justified their existence and have the advantage of an unlimited tenure of their rights.

In 1922 and 1926, further legislation, relative to electric lighting control, took place. The effect of the first of these enactments, among other things, was to establish a body of Electricity Commissioners with a double function. First, to take over the executive functions, approval of schemes for provisional orders, approval of apparatus for metering, etc., making of byelaws for the protection of the public, etc. which had previously been carried out by the Railway Department of the Board of Trade, and secondly to prepare schemes for the better supply of electricity to the public.

In the 1922 Bill it was intended to give the Commissioners certain powers of compulsion as to grouping of generating stations and distribution areas, but the opposition to this in Parliament was too strong, and the Commissioners were left with advisory powers only.

The 1926 Bill established a Central Electricity Board of independent business men, not Members of Parliament, and not financially interested in electrical production or distribution with new powers. The procedure was as follows: The Electricity Commissioners were to prepare schemes for improving the national supply of electricity; the Central Board, if they approved them, were to hear objections, and finally to put them in force. This provided the element of compulsion lacking in the 1922 Act. The plan established by the Act made the Central Electricity Board the clearing house of all electricity supply. Certain generating stations, old or new, became selected stations, the current produced by them was produced for the Central Board and supplied by them to all other distributors. Other generating stations could continue if they sought fit, but they must charge as if their cost of generation were as low as the price at which the Board would supply it. Small stations which under these conditions would have to close up were allowed to apply the difference in price between their cost and the Board's price of current, to writing off the capital which was rendered idle by the provisions of the Act, which being done, the benefit of the decreased cost must accrue to the consumer. In order to connect up the selected stations, so that a minimum of spare plant would be necessary, the Central Board has raised capital separately for the purpose of erecting overhead connecting lines throughout the country, the so called "grid." It is anticipated that in about 10-15 years the small and inefficient stations, numbering nearly 500 will have been extinguished, and all distributing companies will have a supply on the same terms as those who in the past have best situated in this respect.

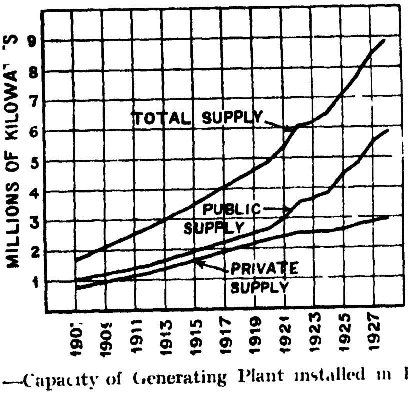


FIG. 7—Capacity of Generating Plant installed in England

Fig. 7. shows the growth of the total capacity of public supply authorities, that is both Municipal and company, and the estimated capacity of plant owned privately in works and collieries, etc., and Fig 8. the estimated total output in millions of electrical units per annum.

Alongside of this growth of public supply for lighting and power which I have referred to was the growth of electric traction, carried out both by Municipalities and by Companies. Horse tramways, like electric lighting, had been the subject of powers of purchase exercisable by the local authorities at 21 years, and as the principal Act was passed in 1873, it followed that by 1894 all tramways were about to fall into the hands of the Municipalities, who

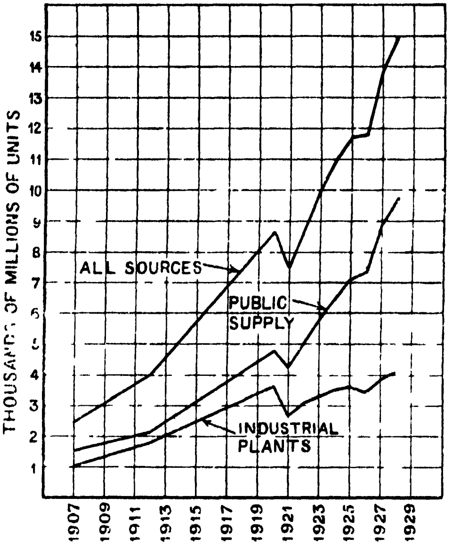


FIG. 8. -Electricity Output in Great Britain.

exercised their powers of purchase, scrapped the lot, and built new tracks and equipped them electrically. The 21 year purchase clause proving in the case of traction, as in the case of electric lighting, outside municipal enterprise, to have closed all enterprise, an Act was passed in 1896 called the Light Railways Act, intended to encourage the creation of light electric railways, running alongside of roads, as in some Continental countries. This Act gave no powers of purchase to local authorities. It had very little effect in this direction, but as no one could tell whether any given line was a tramway or a light railway, a certain number of light railways were constructed under these provisions. It seems now as if the tramway, except where there is very heavy traffic to be carried on fairly open roads, has reached its zenith.

I will now turn to the question of the capital invested in electrical undertakings in Great Britain.

The upper curve on Fig. 9. on the next page, shows the total capital invested in all electrical undertakings, other than traction, by public supply undertakings, aggregating about £295,000,000, and the lower curve shows the capital estimated to be invested in electrical manufacturing concerns. This diagram covers the period from 1903 onwards, and it is interesting to note the acceleration in the rate of investment since the year 1919, i.e., during the post-war period.

In addition to the above, capital expenditure has therefore been incurred in connection with Electric Traction. Including the London Underground

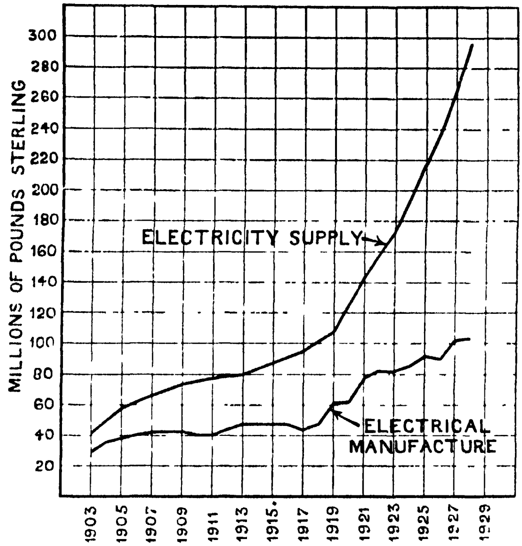


FIG. 9.—Capital Expenditure in Electricity *Supply* and Capital Invested in Electrical Manufacture.

Railways and the Metropolitan Railways, the capital outlay by companies on electric traction has been £183,000,000 and by municipalities £92,000,000 —a total of £275,000,000.

The total capital invested in electric manufacturing, electric supply and electric traction is thus estimated at £671,000,000, and this does not include the amount invested by those who generate electricity for their own use, nor the amount invested in motors and appliances and in private installations for utilizing electric current.

Earlier on I referred to the position of the Royal Society of Arts as the forum before which most of the earlier discoveries and applications of electricity were first presented. I have prepared as an appendix to this address a list of such covering the eighties and early years of the nineties, a perusal of which will, I think, confirm what I have said.

I have now completed the survey, which I planned in this address. It suffers from being too general and yet too condensed. It has not touched on the great subject of the private and industrial uses of electricity. It covers a very remarkable period of our social and industrial expansion and I esteem myself fortunate to have been an eye witness of this growth. May we look at the probable future? Approximately over the last 25 years the consumption of electricity produced by supply authorities has doubled every 6 years. The rate, if anything, is increasing, and we know from the experience of other countries that the point of saturation is a good way off. The electrification of main line railways has not yet commenced. We may without envisaging another period of 50 years, look forward say for 20 years to a period of great activity, both in the science and industrial applications of electricity.

APPENDIX.

Papers on Electricity read at the Society's Meetings between the years 1876-1891.

1876-7	The Telephone	Professor Graham Bell.
1878-9	On the Practical Applications of Electricity to Lighting Purposes	J. N. Shoolbred.
	Edison's Electro Chemical or Loud Speaking Telephone	Conrad Cooke.
1880-1	Recent Advances in Electric Lighting	W. H. Preece.
	The Electric Railway & Transmission of Power by Electricity	A. Siemens.
1881-2	Storage of Electricity	Silvanus P. Thompson.
	Electric Lighting at the Paris Exhibition	W. H. Preece.
	Telephonic Communication	Lt.-Col. C. E. Webber.
	The Fire Risks incidental to Electric Lighting	T. Bolas.
1882-3	Electrical Exhibitions	W. H. Preece.
	The Measurement of Electricity ..	J. N. Shoolbred.
	The Transmission of Power by the Portrush Electrical Railway ..	A. Siemens and E. Hopkinson.
	Electricity as a Motive Power ..	Prof. G. Forbes.
1883-4	Electric Launches	A. Reckenzaum.
	The Progress of Electric Lighting	W. H. Preece.
	Telpherage	Prof. Fleming Jenkin.
1884-5	Electric Lighting in America ..	W. H. Preece.
1885-6	Some Points in Electrical Distribution	Prof. G. Forbes.
	Domestic Electric Lighting ..	W. H. Preece.
1886-7	Glow Lamps; Their Use and Manufacture..	General C. E. Webber.
	Electric Locomotives	A. Reckenzaum.
1887-8	Electric Lighting from Central Stations	Col. R. E. B. Crompton.
1888-9	Electric Meters for Central Stations	Prof. G. Forbes.
	Arc Lamps and their Mechanism ..	Silvanus P. Thompson.
	Secondary Batteries	W. H. Preece.
	Prof. Elihu Thomson's Electro-Magnetic Induction Experiments	Prof. J. A. Fleming.
1890-1	Electric Lighting Progress in London	T. Bailey.

Cantor Lectures delivered between the years 1879-1892.

1879-80	Recent Advances in Telegraphy ..	W. H. Preece.
1880-81	Scientific Principles Involved in Electric Lighting	Prof. W. G. Adams.
1881-2	Dynamo Electric Machinery ..	Prof. Silvanus P. Thompson.
1882-3	Secondary Batteries and the Electrical Storage of Energy	Prof. Oliver Lodge.

1884-5	The Distribution of Electricity ..	Prof. G. Forbes.
1889-90	The Electro-magnet	Prof. Silvanus P. Thompson.
1890-1	Electric Transmission of Power ..	Gisbert Kapp
1891-2	Developments of Electrical Distribution	Prof. G. Forbes.

The Chairman then presented the Society's silver medals for Papers and Lectures delivered during the last session as follows :

Papers read at the Ordinary Meetings :—

Sir Eustace Tennyson d'Eyncourt, K.C.B., D.Sc., LL.D., F.R.S., "Fuel for Ships."

G. G. Blake, M.I.E.E., F.Inst.P., "Applications of Electricity to Medical Practice."

Cecil Hooper, F.L.S., "Fruit Pollination in Relation to Commercial Fruit Growing."

James Morton, "History of the Development of Fast Dyeing and Dyes."

Professor A. E. Richardson, F.R.I.B.A., "Modern English Architecture."

G. H. Nash, C.B.E., M.I.E.E. (European Chief Engineer, International Standard Electric Corporation), "Some Modern Aspects of Electrical Communication."

Robert Burrell, Barrister-at-Law, "Reform of the British Patent System."

Papers read before the Indian Section :—

W. H. Moreland, C.S.I., C.I.E., "The Indian Peasant in History : an Introduction to the Linlithgow Report."

A. T. Cooper, M.Inst.C.E., M.Cons.E., "Recent Electrical Progress in India."

Papers read before the Dominions and Colonies Section :—

Colonel H. L. Crosthwait, C.I.E., "Air Survey and Empire Development."

Dr. H. J. Van der Byl, "The South African Iron and Steel Industry."

Trueman Wood Lecture :—

Sir Alfred J. Ewing, K.C.B., F.R.S., "The Vibrations of Railway Bridges : an Example of Co-operative Research."

Sir George Birdwood Memorial Lecture :—

Captain P. Johnston-Saint, M.A., F.R.S. (Edin.), "An Outline of the History of Medicine in India."

SIR GEORGE SUTTON, Bt. (late Chairman of the Council), said there was one consolation for one who had relinquished the post of Chairman of the Council of the Royal Society of Arts ; apart from the fact that, if he was an indolent man, he could feel he had got rid of a great responsibility, he had the privilege of proposing a vote of thanks to the new Chairman for his Address.

Often the proposer of that vote of thanks would give some account of the career and achievements of the new Chairman, but the Address which Mr. Atkinson had given, a very instructive, entertaining and learned Address, gave a far better idea of Mr. Atkinson's career and qualifications than he himself could give by any recapitulation of the new Chairman's past achievements. Personally, he had been a contemporary of Mr. Atkinson's for very many years, and had witnessed his achievements and seen the great honours which had fallen to him, including, in recent years, the very great distinction of being appointed President of the Institution of Electrical Engineers. Great as that distinction was, however, he thought it was not greater than that which Mr. Atkinson had now attained in being appointed Chairman of the Royal Society of Arts.

Many distinguished men had held that position, but from his long knowledge of Mr. Atkinson's ability, tact and accomplishments generally, he knew that he would maintain the high traditions and prestige of the Society, and that the work for which it had been formed would be worthily carried on.

SIR ROBERT HADFIELD, Bt., D.Sc., F.R.S., in seconding the resolution of thanks, said all the members would be familiar with the valuable work done by Mr. Atkinson during his long career, and his Address contained a fascinating description of what had happened during the period it covered. The Society was greatly indebted to him for the care and pains he must have taken in preparing it.

Reference was made in the Address to wireless matters. One thing which he himself was greatly interested in was the use of high frequency current for the meltiug of steel. His firm was now melting steel by that very remarkable method. The crucible was filled with the metal it was desired to melt, and in about three-quarters of an hour the steel became fluid, without any apparent expenditure on fuel, apart from that consumed in the far-distant power house. That was a very remarkable result, and he ventured to predict that in the not far distant future the very highest qualities of steel would be melted entirely in that way.

Mr. Atkinson had been kind enough to refer to some work which he (Sir Robert) had done on the employment of silicon steel for transformers, in the testing of which he had received great help from his friend Sir Alfred Ewing, whom he was glad to see present that evening. The first transformer made of that steel had been in use for something like twenty-five years, and the Sheffield Corporation were now effecting great economies by the use of that steel.

There was one point on which some assurance from the Chairman would be welcome. Remarkable developments were now taking place in the spreading of electric energy over our little island, and it was to be hoped that this could be done without spoiling our magnificent scenery.

The vote of thanks was carried unanimously.

The CHAIRMAN, in acknowledging the vote of thanks, referred to Sir Robert Hadfield's last remark and recalled that when the Forth Bridge was built people termed it a vile and hideous structure, whereas to-day everybody had been mentally trained sufficiently to realise that it was one of the most wonderful sights in the world. Though personally he was a cable-maker, and would like to see current conveyed underground, he was not one of those who believed that the imposing towers which were being constructed, with the long stretches of parallel wires between them, would spoil the countryside ; ultimately, he thought, it would be realised that they had a beauty of their own, as having behind them something of great meaning in our social and industrial life.

He had brought with him several objects of great historical interest. One was the first tumbler switch ever made. The tumbler switch was an entirely British product, and was hardly used anywhere else in the world. He had also the first bayonet cap lamp holder ever made. One of the inventions which enabled very great difficulties in dynamo design and use to be overcome was the use of carbon brushes, and he had brought with him a piece of the very first carbon brush ever made and used, made by Professor George Forbes, who, he was pleased to say, was still living, and he believed still lecturing every year in Glasgow on astronomy. He had also a piece of the first high pressure cable ever made. All those four things were British inventions and British products, and had never been altered very much since the time they were first invented.

COLONEL R. E. B. CROMPTON, C.B., R.E., who was received with applause on rising, at the invitation of the Chairman, to address the meeting, said he could be of use chiefly as showing that the study of electrical development did not kill one. The number of past Presidents of the Institution of Electrical Engineers who were still alive and well was remarkable The study of electrical phenomena was so interesting, and tended to develop a soul in a man which was quite different from the soul of the average engineer engaged in other branches of engineering science, that it seemed to prolong life !

He had listened with the greatest interest to the Chairman's Address, which was substantially correct It was curious to see in the daily papers so many extraordinary errors as to electrical work in the early days For instance, in talking about the new lighting of the Savoy theatre, with its thousands of lamps, the papers said " What a contrast with the early days, when there were but twelve bulbs!" No man, however, would be such an idiot as to think he could light a theatre with twelve bulbs.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

◆

MONDAY, NOVEMBER 5 Actuaries Institute of, Staple Inn Hall, Holborn, W C 5 p m Mr H J Tappenden, " A Valuation of Non Participating Policies without Classification "

Electrical Engineers, Institution of Savoy Place W C 7 p m Discussion on ' Wooden Poles for Overhead Transmission Lines and their Preservation ' Opened by Mr W J Highfield

University of London at King's College, Strand, W C 5 30 p m Dr H C Barnard, " The Education of Girls in France under the Ancien Regime ' (Lecture II)

At King's College Strand, W C 5 30 p m Mr P L Witherby, " The Making of The Times '

At King's College, Strand, W C 5 30 p m Prof H Zickendraht, " Scientific Radio Research in Switzerland " (Lecture IV)

At the London School of Economics Houghton Street, W C 4 30 p m Mr E H Warmington, " The Debt of Medieval Explorers to Ancient Discoverers (Lecture II)

At the London School of Economics Houghton Street W C 5 p m Prof P Vaucher, " La Sorbonne

At the School of Oriental Studies, Finsbury Circus E C 5 30 p m Dr W R Rickmers, " The Alai-Pamirs, a Geographical Background of Oriental Studies (Lecture I)

At University College, Gower Street, W C [illegible] p m Prof H R Spencer, ' Medicine in the Days of Shakespeare "

At University College, Gower Street, W C 5 30 p m Miss E J Davis, ' How London became the Capital of England " (Lecture II)

TUESDAY, NOVEMBER 26 Anthropological Institute, at Burlington House, W 8 30 p m Baron Erland Nordenskiold, ' The American Indian as an Inventor " (Huxley Memorial Lecture)

Electrical Engineers, Institution of, at Armstrong College Newcastle-on-Tyne 7 p m Captain P P Eckersley, " Broadcasting by Electric Waves " (Faraday Lecture)

At the Hotel Metropole, Leeds 7 p m

At the Engineers' Club, Manchester 7 p m Lieut Colonel S I M [illegible] and Mr L C Grant, " The Heating of Buildings Electrically by means of Thermal Storage '

At the University, Nottingham 6 45 p m Messrs J H Smythe and E G Weeks ' Low Temperature Carbonization of Fuel with special reference to its Combination with the Production of Electricity "

Marine Engineers Institute of, 85 88 The Minories, E C 6 30 p m Mr A J Evans The Origin and Development of Heavy Oil Engines

Metal Institute of, at the Chamber of Commerce, Birmingham 7 p m Mr G W Woolliscroft, " The Modern Development of the Steam Locomotive "

University of London at King's College, Strand, W C 5 30 p m Prof Sir B Pares ' Russian History to 1861 Lecture VII Muscovy "

King's College, at 40 Torrington Square, W C 5 30 p m Dr J Krzyzanowski " The Polish Novel in the 19th Century Lecture VI Eliza Orzeszkowa, the Painter of her Country

At the School of Oriental Studies Finsbury Circus, E C 5 30 p m Dr W R Rickmers " The Alai-Pamirs, a Geographical Background of Oriental Studies ' (Lecture II)

At University College, Gower Street, W C 6 p m Mr E T Elbourne, " Engineering Management ' (Lecture III)

At Westfield College, Hampstead, N W 5 15 p m Prof O Elton, Spenser

WEDNESDAY, NOVEMBER 27 Automobile Engineers, Institution of at the Engineers Club Manchester 7 p m Mr J R Banks The High-Speed Compression Ignition Heavy-Oil Engine '

Egypt Exploration Society, Burlington House, W 8 30 p m Dr John Johnson " The Search for Lost Literature in the Rubbish Heaps of Egypt '

Electrical Association for Women, 46 Kensington Court, W 3 p m Mr E E Sharp, ' Some Electrical Experiences in Australasia

Eugenics Society, at Burlington House, W 8 30 p m Mrs C B S Hodson, " Sterilization and Social Ideals "

Historical Society, at 22 Russell Square, W C 5 p m Sir Richard Lodge, Presidential Address " Thomas Frederick Tout A Retrospect of Two Academic Careers '

Physics, Institute of, at the Institution of Electrical Engineers, Savoy Place, W C 5 30 p m Dr C H

Lander, "Physics in Relation to the Utilization of Fuel."

Public Health, Institute of, 37 Russell Square, W.C. 4 p.m. Prof. Dr. S. L. Cummins, "Some Aspects of the Tuberculosis Problem."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. R. R. Gates, "The Contribution of King's College to the Advancement of Learning during the Century 1829-1928. Lecture VIII—The Sciences of Life."
At King's College, Strand, W.C. 5.30 p.m. Madame Aino Kallas, "Modern Esthonian Literature. Lecture II—Gustav Suits."
At King's College, Strand, W.C. 5.30 p.m. Prof. H. Zickendraht, "Scientific Radio Research in Switzerland." (Lecture V).
At the London School of Economics, Houghton Street, W.C. 6 p.m. Lecture VIII on "Office Machinery."
At the School of Oriental Studies, Finsbury Circus, E.C. 5.15 p.m. Mr. A. Lloyd-James, "Accent as an Element in Speech."
At University College, Gower Street, W.C. 3 p.m. Dr. C. Pellizzi, "La Lirica del Paradiso." (Lecture IV)
At University College, Gower Street, W.C. 5.30 p.m. Mr. L. McColvin, "Some Aspects of the Future of Public Library Work."
At University College, Gower Street, W.C. 5.30 p.m. Mr A. M. Wijk, "The Reformation Period in Sweden." (Lecture I).

THURSDAY, NOVEMBER 28..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Squadron-Leader H. M. Probyn, "Flying and Maintenance from the Owner's Point of View."

Automobile Engineers, Institution of, at the Y.M.C.A. Hall, Newcastle-on-Tyne. 8 p.m. Mr. A. Healey, "The Pneumatic Tyre in Heavy Transport."

Electrical Association for Women, 46 Kensington Court, W. 7 p.m. Mr. H. Bourne, "The Construction, Use and Maintenance of Electric Kettles, Toasters, Irons and other Small Apparatus."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Mr. H. W. Taylor, "Voltage Control of Large Alternators."

Historical Society, at 22 Russell Square, W.C. 5.30 p.m. Prof. Dr. Ernest Barker, "Islam and the Crusades."
L.C.C. The Geffrye Museum, Kingsland Road, E. 7.30 p.m. Mr. Ralph Edwards, "The Dining Table"

Mechanical Engineers, Institution of, at the Engineers' Club, Manchester. 7.15 p.m. (1) Mr. Francis Hodgkinson, "Journal Bearing Practice." (2) Mr. R. O. Boswall, "Bearings."
At the South Wales Institute of Engineers, Cardiff. 6.30 p.m. Prof. H. L. Callendar, "Critical Relations between Water and Steam." (Thomas Hawksley Lecture).

North East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-on-Tyne 6 p.m. Mr. G. S. Baker, "Wake."

University of London, at Bedford College for Women, Regent's Park, N.W. 4.30 p.m. Prof. Eccles, "Montaigne" (in French). (Lecture VIII).
At King's College, Strand, W.C. 5 p.m. Dr. W. Robson, "Protein Metabolism." (Lecture III).
At King's College, Strand, W.C. 5.30 p.m. Mr. I. L. Evans, "Austria in the Eighteenth Century." (Lecture III).
At King's College, Strand, W.C. 5.30 p.m. Mr. G. Shaw, "The Story of Descant."
At King's College, Strand, W.C. 5.30 p.m. Dr. J. A. Williamson, "The Cabots and the Discovery of the New World." (Lecture III).
At the School of Oriental Studies, Finsbury Circus, E.C. 5.30 p.m. Dr. W. R. Rickmers, "The Alai-Pamirs, a Geographical Background of Oriental Studies." (Lecture III).
At University College, Gower Street, W.C. 5.15 p.m. Prof. J. E. G. de Montmorency, "Momentous Lawsuits and Trials in various Countries from Classical to Modern Times." (Lecture III).
At University College, Gower Street, W.C. 5.30 p.m. Prof. W. M. Dixon, "England, The Bible, and Shakespeare." (Lecture V).

Victoria and Albert Museum, South Kensington, S.W 5.30 p.m. Mr. S. C. K. Smith, "Painters of the Norwich School."

FRIDAY, NOVEMBER 29..Chadwick Public Lecture, at the College of Medicine, Newcastle-on-Tyne. 8 p.m. Prof. A. E. Boycott, "The Causes of Cancer."

Junior Institution of Engineers, 39 Victoria Street, S.W 7.30 p.m. Mr. W. C. Freeman, "Modern Welding Systems and Applications."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Open Debate on "The Registration of Reliable Tests of Power-Plant Machinery." Introduced by Mr. R. H. Parsons.

University of London, at King's College, Strand, W.C. 5.30 p.m. Rev. E. I. Fripp, "Shakespeare's Spelling".
At King's College, Strand, W.C. 5.30 p.m. Prof. F. H. Marshall, "Two Mediæval Greek Romances."
At King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "The Russian Drama. Lecture VII—Chekhov."
At King's College, Strand, W.C. 5.30 p.m. Prof. H. Zickendraht, "Scientific Radio Research in Switzerland." (Lecture VI).
King's College, at 40 Torrington Square, W.C. 5.30 p.m. Dr. O. Odlozilik, "Outlines of Czechoslovak History. Lecture II—The Czechs and Slovaks in the Middle Ages."
At University College, Gower Street, W.C. 5.30 p.m. Prof. W. M. Dixon, "England, The Bible, and Shakespeare." (Lecture VI).

SATURDAY, NOVEMBER 30..L.C.C. The Horniman Museum, Forest Hill, S.E. 3.30 p.m. Mr. H. N. Milligan, "The Hydra in Fact and Fiction."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4019 *FRIDAY, NOVEMBER 29th*, 1929 VOL LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C 2.

NOTICES

NEXT WEEK

MONDAY, DECEMBER 2nd, at 8 p.m (Cantor Lecture) E. G RICHARDSON, B.A., Ph.D., D.Sc., Lecturer at University College, " Wind Instruments from Musical and Scientific Aspects " (Lecture III)

Demonstrations will be given on the various instruments.

WEDNESDAY, DECEMBER 4th, at 8 p m (Ordinary Meeting) HARRY H. PEACH, Hon. Secretary, Council for the Preservation of Rural England Exhibition Committee, " The Advertiser and the Disfigurement of Town and Countryside. Criticisms and Suggestions " SIR LAWRENCE WEAVER, K B.E , will preside.

The paper will be illustrated with lantern slides.

THIRD ORDINARY MEETING

WEDNESDAY, NOVEMBER 20th, 1929. MR. ROGER E. FRY in the Chair A paper entitled " Urban and Rural Amenities " was read by MR P. MORLEY HORDER, F.S.A. The paper and discussion will be published in the *Journal* at an early date.

CANTOR LECTURES

MONDAY, NOVEMBER 25th, 1929. SIR RICHARD A. S. PAGET, Bt., in the Chair. MR. E. G. RICHARDSON, B.A., Ph.D., D.Sc., delivered the second of his course of three lectures entitled " Wind Instruments from Musical and Scientific Aspects." The lectures will be published in the *Journal* during the Christmas recess.

PROCEEDINGS OF THE SOCIETY

SECOND ORDINARY MEETING

WEDNESDAY, NOVEMBER 13TH, 1929

MR. CHARLES VERNON BOYS, F.R.S., in the Chair

The following paper was read:—

NEW DEVELOPMENTS IN HYDRAULIC PNEUMATIC ENGINEERING

By J. O. BOVING

The particular aspect of hydraulic engineering which will be discussed here is the direct conversion of water power into air power, and *vice versa*. A good deal of research and test work has been carried out during the last five years and some new ground has been broken.

The various systems and developments referred to hereafter have been called " Hydrautomats," indicating hydraulic automatic apparatus serving a diversity of ends.

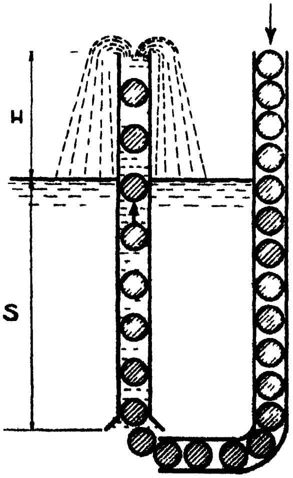


FIG. 1.

A stone falls to the ground because it is heavier than air. A piece of cork which is introduced under water will speedily rise to the surface, and the water will bulge upwards above it. We could carry out an experiment as shown by Fig. 1, introducing suitable pieces of cork at the bottom of a pipe immersed in water, and the effect would be that the cork pieces would carry the water in the pipe higher and higher, and fresh water would enter at the bottom.

To attain a certain lift, sufficient cork must be introduced to make the combined weight of the cork and the water in the rise pipe, which has a length S + h, equal to the weight of water only in a tube of equal diameter and of a length S.

If we introduce air under suitable pressure, instead of cork, we have an *air lift pump* (Fig. 2), well known to engineers, but not very well understood, and consequently not in use as much as this exceedingly simple and reliable contrivance deserves to be.

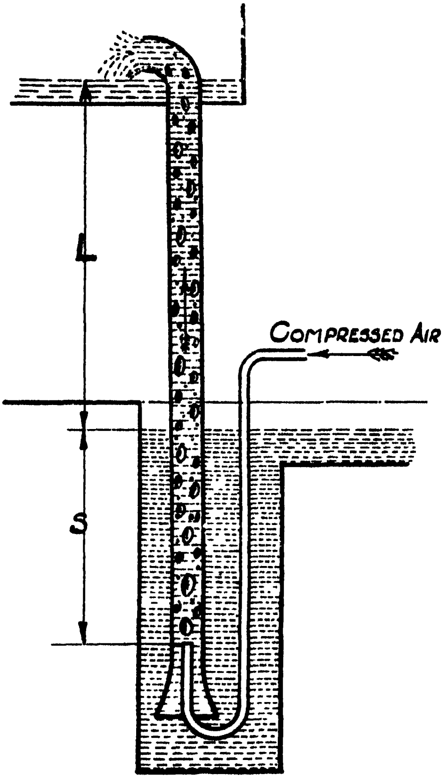


FIG. 2.

If we were to imagine the air being introduced as minute bubbles, so that the rise pipe would be filled with an emulsion of water and air, then we could talk of the specific gravity of this emulsion (g) as related to that of water (1) as $\frac{g}{1} = \frac{S}{S+h}$

In practice the problem is not as simple as this. It is not possible to divide up the air in such minute bubbles, and the larger the bubbles are, the more elusive they become. If we go back to Fig. 1, it is evident that if the cork balls are as large as the pipe very little slippage could take place, and the individual cork balls would patiently carry their allotted water burden upwards.

The air bubbles, on the other hand, try to escape this desired and important duty, slip sideways, or become elongated vertically so as to sneak upwards against lessened resistance, with disastrous results to efficiency. This efficiency is further decreased by the turbulence caused by the unruly air, whereby not only great internal friction is set up, but the friction against the pipe walls is also increased.

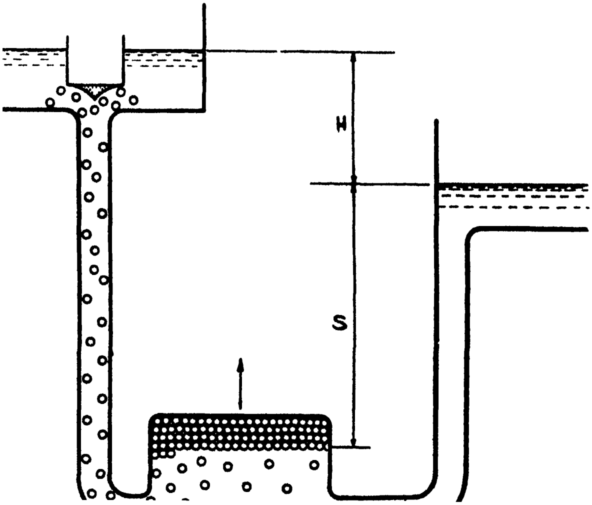


Fig. 3.

Careful tests and experiments have, however, shown that by proper designing of the air and water inlets, correct dimensioning of the pipes for a given duty, and by using suitable air pressure, the unruly bubbles can be tamed to a great extent, and efficiencies well over 50 per cent. may be obtained.

Let us now reverse the process illustrated by Fig. 1 and consider an experiment as indicated by Fig. 3. Here we have a head of water (h), and the water is allowed to flow through a down cast pipe, a collector tank, an upward pipe, and away to the tail race. If there were no obstruction in the path of the water, it would flow through the system at great velocity, and all the energy of the fall converted to velocity would be dissipated in internal and external friction, and thus transformed into heat. Now assume that we introduce at the intake mouth a stream of small cork balls. As long as the velocity of the water is higher than that corresponding to the buoyancy of the balls, these will be carried downwards with the water until they reach the collector tank. If this is of ample dimensions, the water velocity will be low here, and the cork balls will speedily rise to the roof, and here collect, whereas the water will proceed through the upcast pipe to the tail race. The collected balls will exert an upward lift on the roof of the tank.

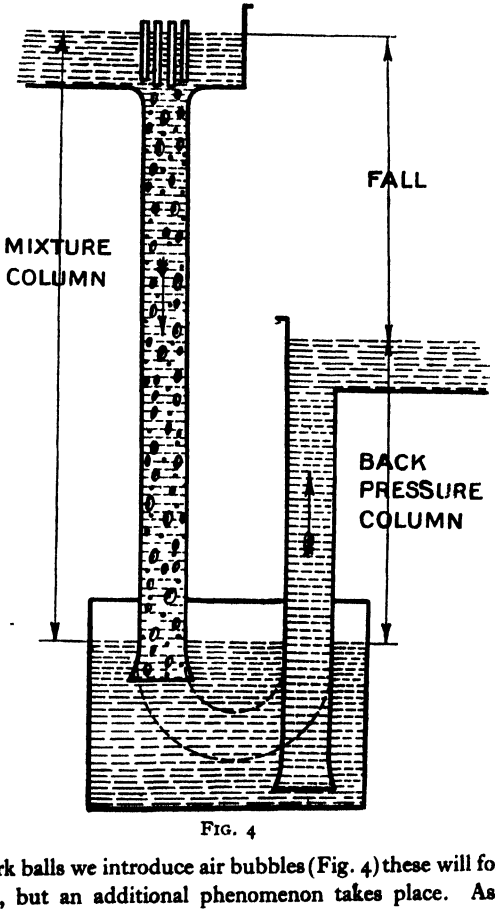


Fig. 4

If instead of cork balls we introduce air bubbles (Fig. 4) these will follow the same path as the cork, but an additional phenomenon takes place. As the bubbles proceed downwards, the water exerts an increasing pressure on them; they are squeezed smaller and smaller until liberated at the top of the collector tank. Here then we have compressed air corresponding to the static pressure of the water column (S), which balances the longer column of the down cast pipe = S + h, consisting of a mixture of water and air. And this compression is isothermal because the heat of the compression is continuously given off to the surrounding water. Another interesting and valuable effect is added: the moisture in the air will be condensed by the colder water, resulting in dry air.

It may be asked how the air can be entangled with the water. This is not even difficult—it is almost unavoidable if the surface of the water in the head race is not too high above the down cast pipe. When a wash basin or bath is emptied, a vortex is formed and through the centre of this air is sucked down, as we all know. But it is desirable to break up the water and air, and to cause disturbances so as to reduce the size of the air bubbles, for exactly the same reasons as were given for the air lift pump.

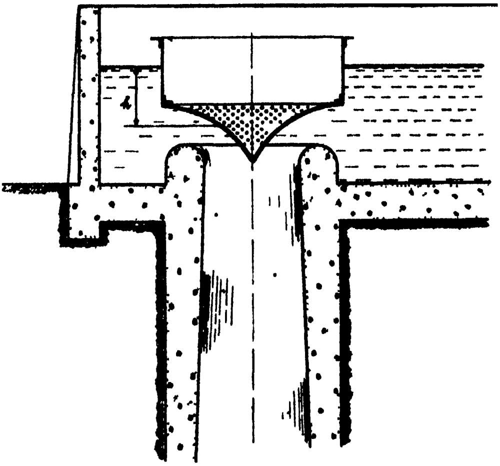


FIG. 5

An inlet and arrangements for the aspiration of air which have proved satisfactory are shown by Fig. 5. The entrance for the water is so dimensioned and shaped that the velocity here is slightly higher than the spouting speed for the head (h). Thus there is sub-atmospheric pressure on the roof of the inlet, and this being perforated with a great number of small holes, air freely enters the water at all points.

Such Hydraulic Air Compressors have been built in a simple form for centuries by blacksmiths in the Vosges and Pyrenees, providing air for their forges. During the last 30 years a number of serious installations have been built in various parts of the world, but particularly in Canada and Germany. In Canada the well-known engineer, C. H. Taylor, constructed several commercially successful plants of large dimensions. It is, however, an art that is very little known, and consequently some plants have given a poor efficiency.

The test and research work lately done in England has proved that with a correct design, and with proper attention to detail, a direct conversion of foot pound water power into foot pound air power—isothermal compression—an efficiency from 55 per cent. to 75 per cent. can be obtained. The variation depends on the relation between the available fall and the desired compression, as well as on the size of the plant. If the same conversion were to be made by water turbines and mechanical compressors the residual efficiency would be from 35 per cent. to 50 per cent.

And what a beautifully simple apparatus the Hydraulic Compressor is, requiring no attention and subject to no wear, and thus no repairing costs.

The idea may now be carried one step further and used for rarefying air instead of compressing it. To this end an arrangement diagrammatically shown by Fig. 6 is used. The water is taken up from the head race through a syphon, the longer leg of which dips into the tail race. Air is drawn in at the top by suitable arrangements and the degree of rarefaction is determined by the length of the shorter leg of the syphon. Obviously the rarefied air is compressed from a partial vacuum to atmospheric pressure. It is necessary to devise some priming arrangement to start the syphon and such will be described later on in connection with plants actually in operation All the observations made with reference to the

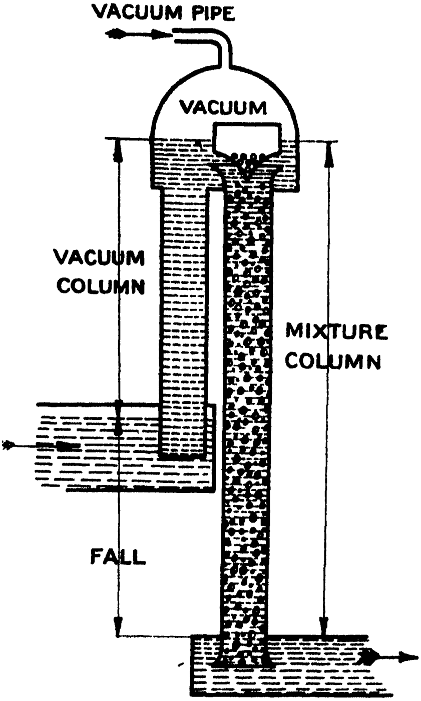


FIG. 6.

compressor are equally valid for the rarefier, with this exception—that it is obviously more difficult to entangle the rarefied thin air with its corresponding higher buoyancy. It has been found that the greatest rarefaction which can be obtained at a commercially useful efficiency corresponds to about 24ft. water column at sea level.

It became a logical development to combine the Compressor and rarefier into one unit, as shewn by Fig. 7. This demonstrates a plant built entirely in concrete, except for the inlet members for the rarefied air. From the head race the water mounts up into the syphon, and at the top of the downcast leg the air is sucked out from the hollow fish-shaped aspirator members, perforated by small holes, and the air bubbles descending with the water are now subjected to compression, first to atmospheric pressure, and then to a pressure corresponding to the difference in the level between the tailrace and the water in the separation chamber. From this the pressure air is led off by a pipe, whereas the partial vacuum is maintained in the pipe leading to the syphon aspirators.

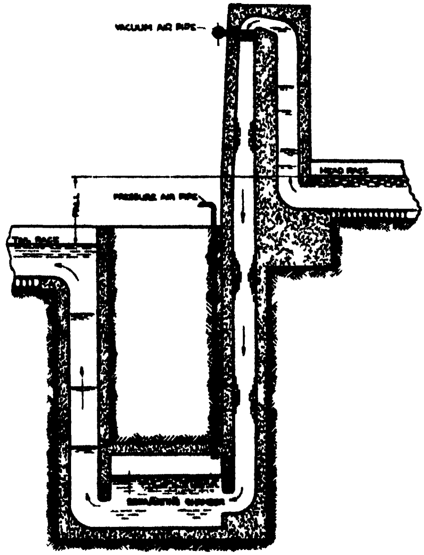


FIG. 7.

There are several important features about this combination, eliminating some drawbacks which under certain conditions are inherent in the Hydraulic Compressor or Rarefier, when built singly. Thus in a compressor great variations in the upstream level will cause loss in efficiency. To a certain extent this may be overcome by floating air inlets, but this is a clumsy arrangement and is not practicable for large plants. Any head which is above the intake is lost, or nearly lost, and if, for example, the available working head were 10 feet, and the upper water were to rise 2 feet above its normal level, then there would be nearly 20 per cent. loss from this cause alone. Similarly, if at a rarefier the tail race level were to rise above the normal, then the air would have to be compressed to a corresponding degree above atmospheric pressure, which work would be a clear loss. Thus we see that the rarefier is not influenced by variations in the upstream level, neither is the compressor influenced by fluctuations downstream, and the combination achieves an ideal plant.

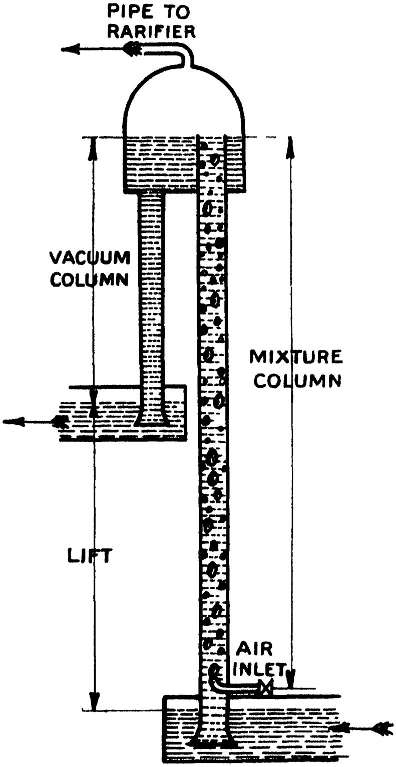


Fig. 8.

Returning to the air lift pumps, an arrangement is shown by Fig. 8, where rarefied air is used for such a plant. The apparatus forms a syphon in which the longer leg contains a mixture of water and air, and the shorter leg solid water. The two legs open at the top into a vacuum chamber, which is connected to the rarefier by a pipe. At some little distance above the lower water level atmospheric air is introduced, and will be sucked in freely, as a partial vacuum exists here corresponding to the height above the lower water level. The air will rush up into the pipe and aerate the column, causing the mixture to overflow into the vacuum tank at the top. Here the air is sucked away to the rarefier and the water descends the shorter leg, which dips into and is sealed by the upper water level.

A rarefier and a continuous vacuum lifter are shewn side by side in fig. 9.

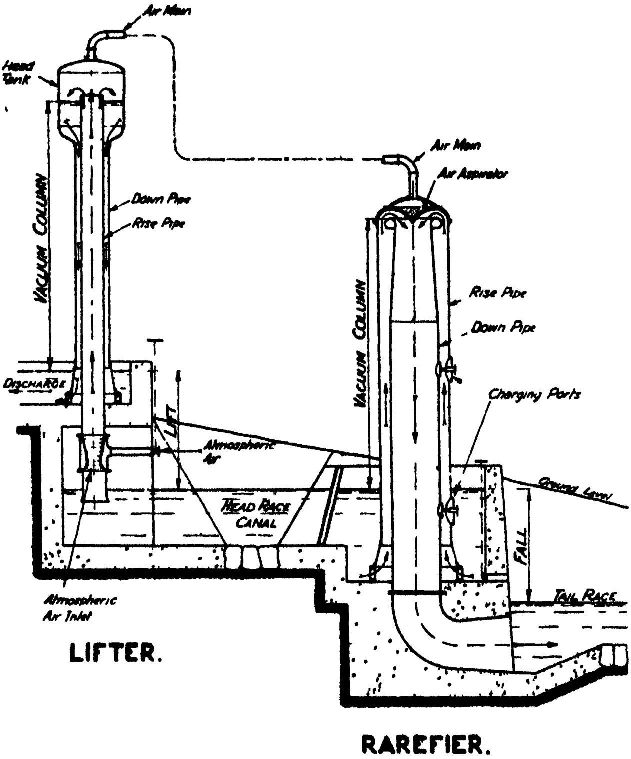
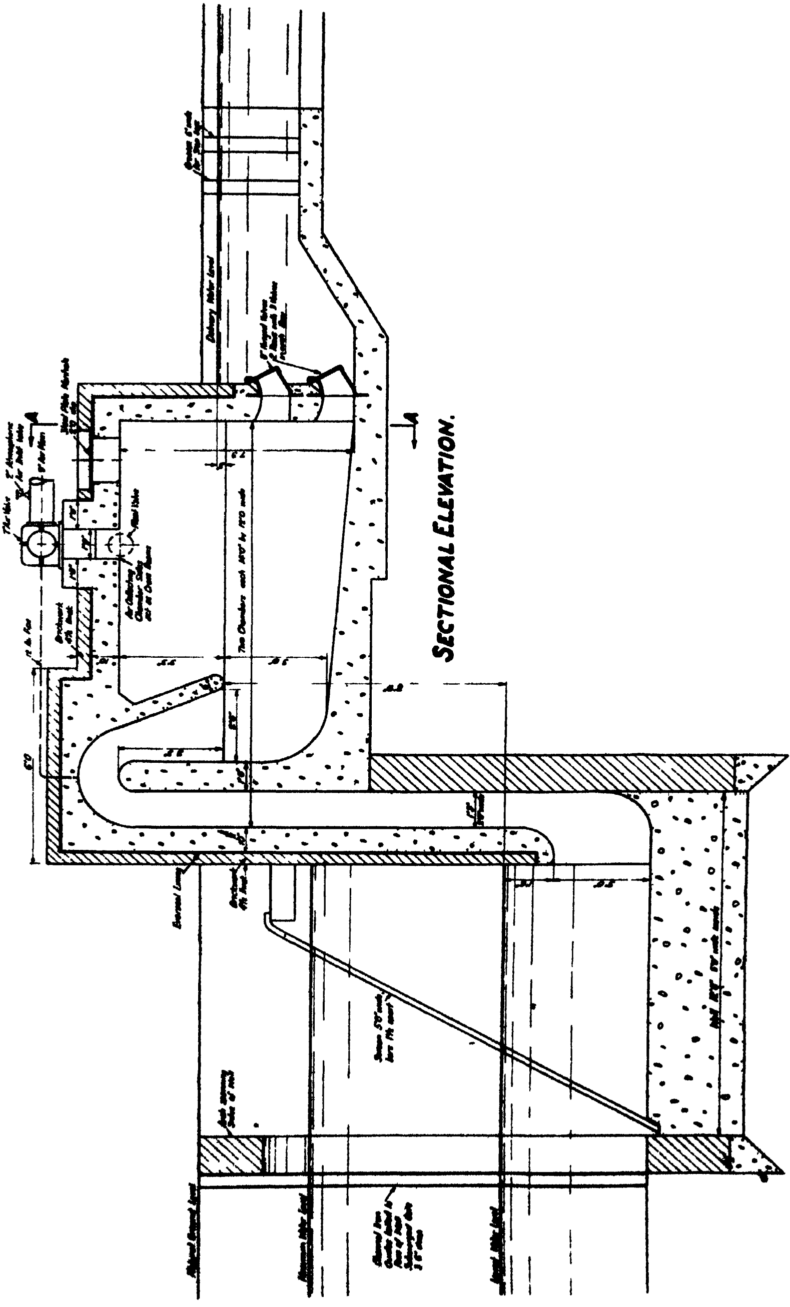


Fig. 9.

A combined pressure and vacuum air lift pump has also been designed to work in conjunction with the combined compressor and rarefier, as described above. The pressure air coming from the compressor tank is introduced at the bottom of the lift column, which carries a vacuum tank at the top, and from this the air is sucked away to the rarefier and the water descends into the upper level of the pump. Thus the same air circulates throughout the system, modified by such extra requirements as may be governed by the pressure lift, being a larger or smaller proportion of the whole than the vacuum lift.

The air lift pump constitutes an extremely simple, reliable and cheap apparatus, which deserves a very wide application, now that it can be designed to give a good efficiency. It is true that compared with other means of pumping the theoretical



SECTIONAL ELEVATION.

FIG. 10

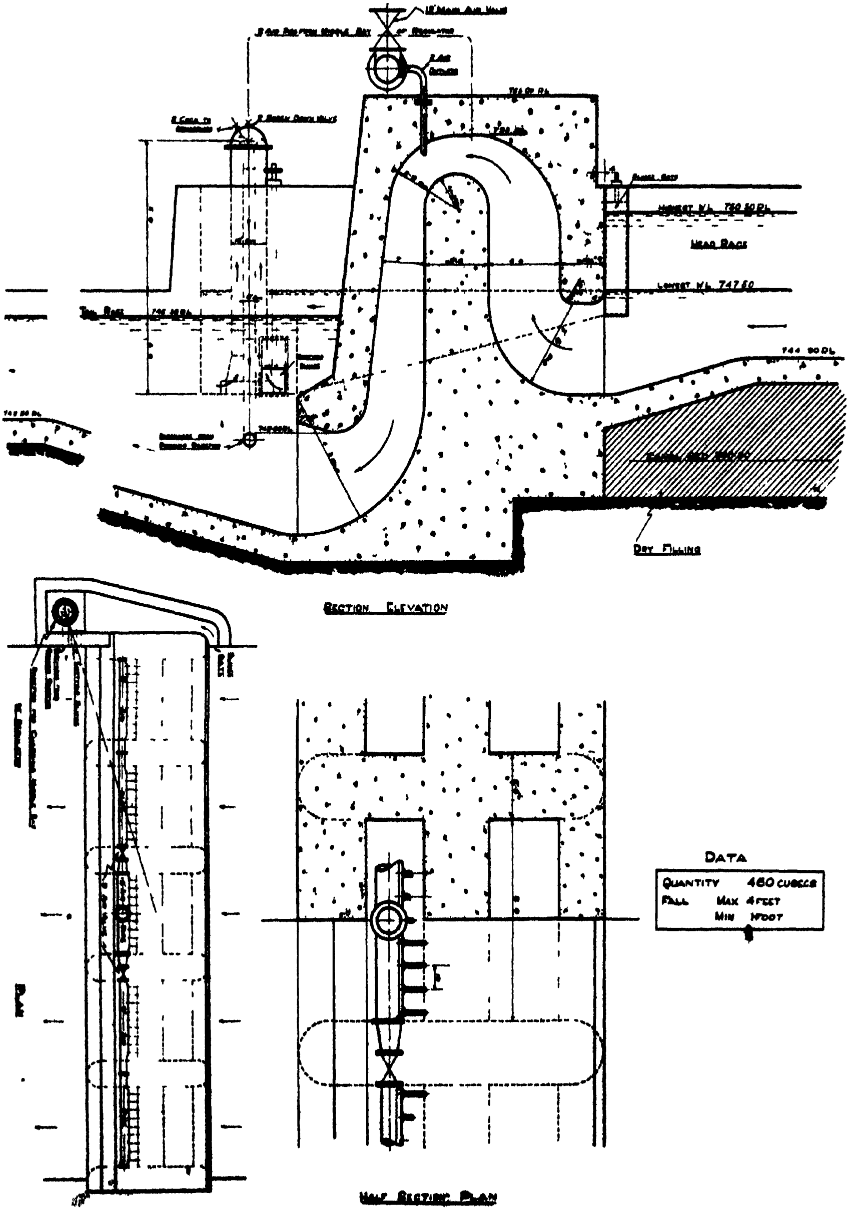

Highest W.L. 750.50 D.L.
Head Race
Lowest W.L. 747.50
Tail Race
744.90 D.L.
Dry Filling
Section Elevation
Plan
Half Section Plan
Data
Quantity 460 cusecs
Fall Max 4 feet
Min 1 foot

FIG. 11.

efficiency is rather low, but when one considers its absolute freedom from stoppage, the absence of costs for attendance and repair, as well as its cheapness, the practical efficiency is really very high.

A pneumatic lifter of a different design and giving a higher efficiency is shewn by Fig. 10. The example demonstrates an intermittent lifter for rarefied air, but the same principle is also applicable to pressure air, whereby the lifting chamber is immersed in the water to be pumped.

The apparatus consists of a syphon lift pipe, a tank, a set of water valves, and an automatically operated change-over air valve. The system is duplicated, so that when one tank is filling the other is discharging. The air valve opens the tank to the vacuum pipe coming from the rarefier, whereby water is sucked up through the syphon until the tank is full. The air valve is now changed over, actuated by a float which is lifted by the rising water. A suitable relay movement is used to prevent the valve from sticking half way through its stroke. Atmospheric air is now introduced (whilst the vacuum is applied to the other tank) and the water flows out past the reflux valves.

A modification of the syphon rarefier has been applied to regulating the flow over a weir. The usual mode of regulation is by sluice gates of various designs and magnitude, and those who are familiar with large scale irrigation work will know how expensive, complicated, and clumsy in manoeuvring such sluice barrages are.

Fig. 11 demonstrates a "Hydrautomat" regulator which is extremely simple, cheap to build, and easy to operate. The syphon stretches right across the canal, and the centre wall provides a complete shut off for the water when the syphon does not function.

Air is introduced into the downcast leg of the syphon as shown above, for the rarefiers, and the power in the fall is dissipated by the compression work done. The more air is admitted the less water flows through, and thus by having all the air inlets coupled to a bus pipe, fitted with an admission valve, the flow of water can be regulated by controlling this valve. Such control may be effected either by hand, or automatically by a float in the upstream or downstream water level—with a view to keeping this constant. The design shows the regulator consisting of 5 bays. Two other valves are fitted on the bus pipe, and thus one, three, or five bays can be in operation, and the closest regulation of the waterflow can be effected. The priming of the syphon is effected by a small auxiliary rarefier built separately on the side of the regulator.

The above indicates in a simple way the theories and practical conditions which underlie the "Hydrautomat" developments. In the following, descriptions of some representative plants are given.

Fig. 12 is a drawing of a compressor plant built at Alston in Cumberland. The available head is 180ft. A 500ft. long pipe line conveys the water downhill to the compressor. On the top of a tower a tank is mounted, to which the pipe line is connected. The compressor pipe carries an air intake on top and dips vertically

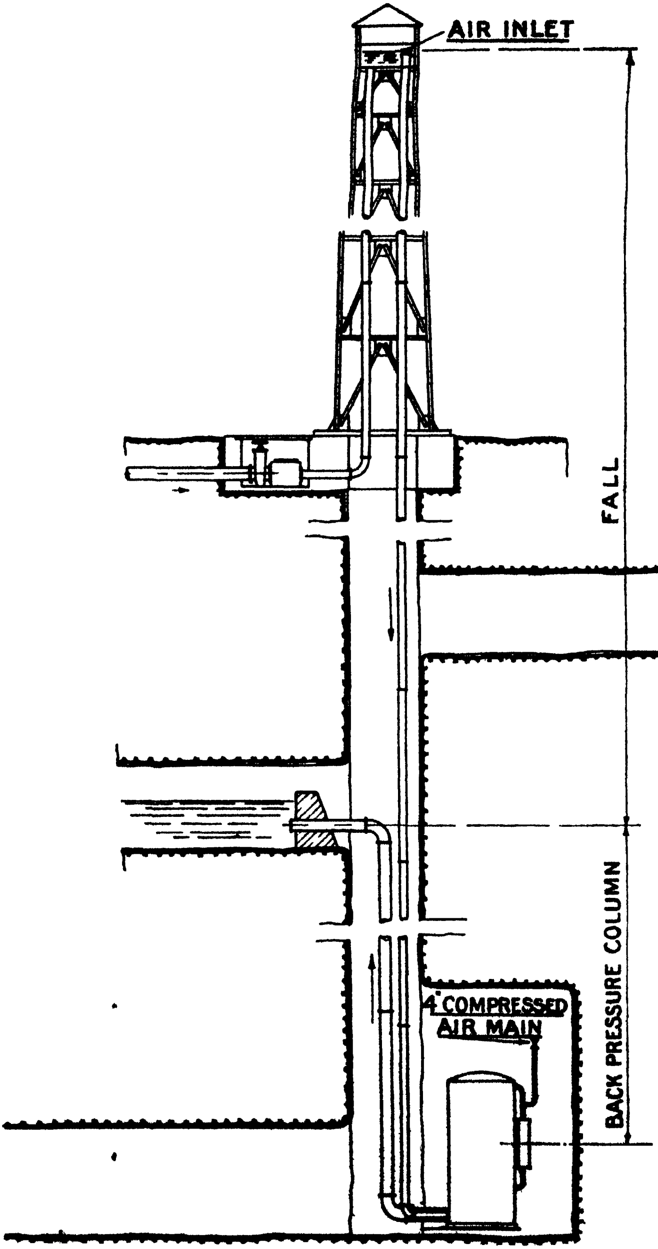


FIG. 12.

410 feet into an old disused mine shaft. At the bottom of this is an air separator built of steel. An automatic valve controls the water level inside the tank. The water rises up again 210 feet from the tank to the tail race, for which an old gallery is used which opens out further downhill.

The degree of compression corresponds to 90lbs. per square inch, and the output is 480 cubic feet of free air per minute. The efficiency is about 65 per cent. If a pelton wheel driving a mechanical compressor were used, the output would only be about 290 cubic feet of free air per minute. The compressed air is used for drills and other pneumatic tools in the mines belonging to the Vieille Montagne Zinc Company. Another similar compressor is working nearby in another mine.

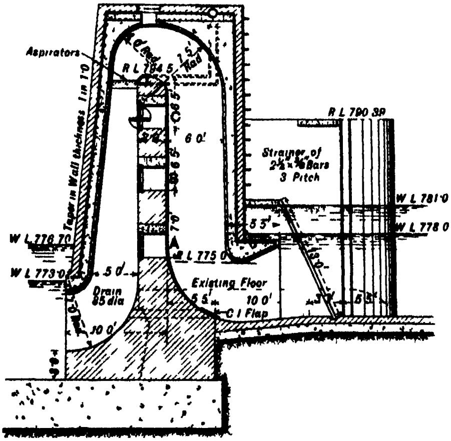


FIG 13 *

Most of the Hydrautomat water lifting work has been done in India in connection with irrigation, which in that country is carried out on a gigantic scale. Few people realise that some 40,000,000 acres are under irrigation in India. The area of arable agricultural land in England is about 10,000,000 acres. Take for example the Punjab—" the land of five rivers "—there are a dozen or more canals, each a hundred or more miles long, and each carrying an amount of water thirty or forty times greater than the summer flow of the Thames. These main canals and their branches flow over the gradually sloping plain, and at intervals there are barrages to keep up the desired water levels, thus creating low falls. At such places Hydrautomats are put in.

Wherever intensive irrigation is applied water-logging sets in sooner or later, throwing the land out of cultivation, and in the Punjab alone it is estimated that over a million acres are so affected.

A typical plant lifting water from a drainage canal in such a district will be shown. Fig. 13 is the rarefier installed at *Bambanwala* on the *Upper Chenab Canal.* The

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syphon is built of brick and re-inforced concrete, with a sealing layer so as to make the whole edifice impervious to air. The dimensions of the intake are 6ft. x 8ft. 5ins., and the water that can pass through at full velocity is about 300 cubic feet per second.

In the middle wall there are three ports which can be closed by butterfly valves. The lowest of these opens below the lowest upstream water level. In starting the syphon this valve is opened, water rushes through and splashes down into the lower level, and by this commotion a certain amount of air is entrapped and carried away to the tail race. As the whole syphon is water sealed the air becomes gradually rarefied, and the water level in the two legs begins to mount. When it reaches the next port the action gains fresh impetus and thus proceeds up to the topmost port, and finally over the crown. When the water gets this far, the syphon is filled instantaneously almost and the priming ports can be closed The apparatus is in function.

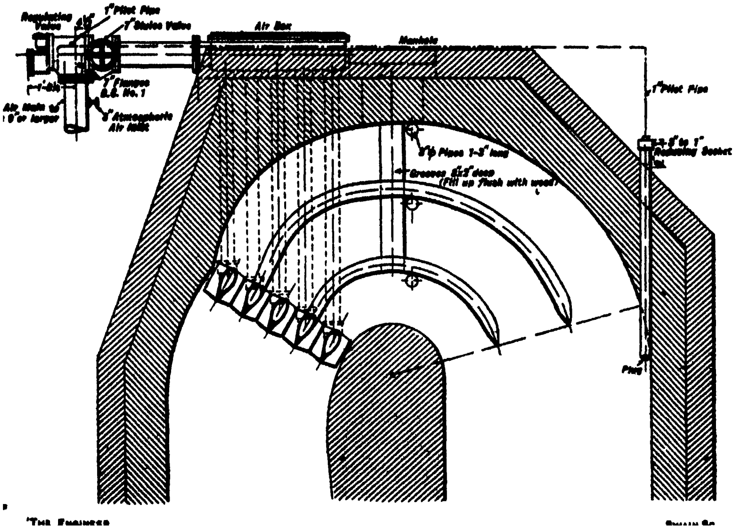

FIG. 14*

Fig. 14 is a drawing of the aspirators, which as will be seen are hollow, and perforated with a great number of holes, through which the air is sucked into the water. The aspirators are connected to a collector and to the pipe line.

Fig. 15 shows diagrammatically a contrivance to prevent a violent inrush of air to the syphon, should the outside pipe line suddenly be opened.

This consists in principle of a float connected to a valve mounted on the air pipe line. If too much air should be drawn in by the aspirators the level in the

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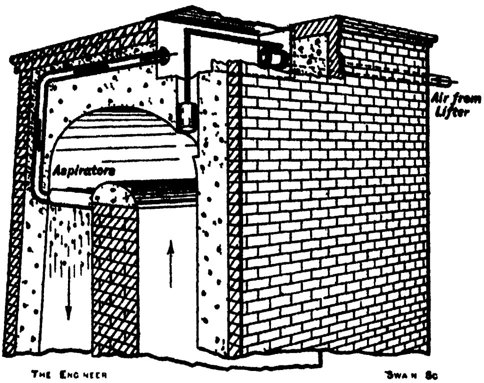

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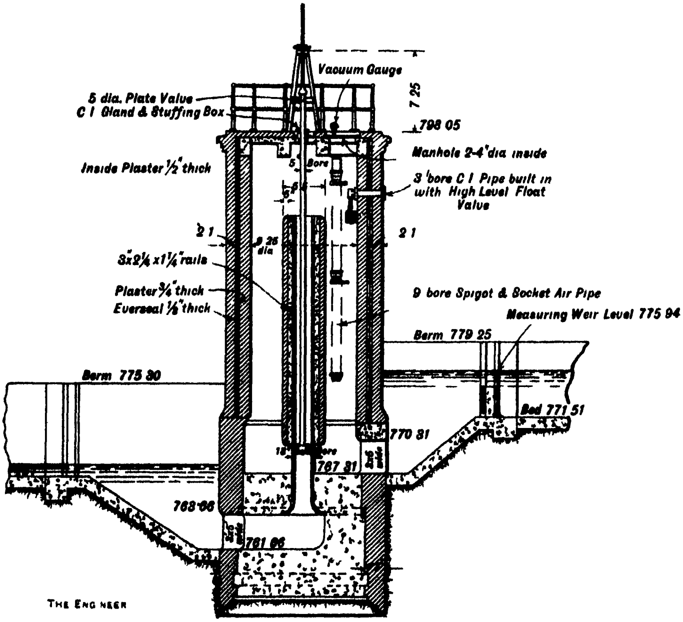
Fig. 15 *



THE ENGINEER

Fig. 16 *

crown of the syphon would at once tend to fall, this would influence the float, and the valve in the pipe line would be throttled

Fig. 16 shows a section of a continuous vacuum lifter, which is operated in connection with the rarefier just described. The lifter is built as a tower in brick,

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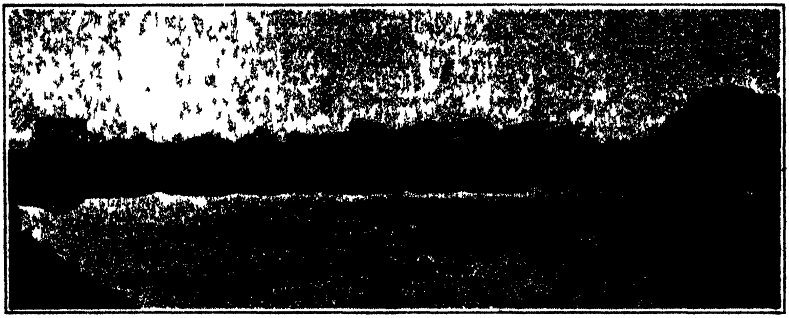
*Reproduced by kind permission of the Editor from *The Engineer*, Sept 6th, 1929 and has an air-tight sealing layer in the middle of the brick walls. There are three pumping pipes built of pre-cast concrete 18ins. in diameter. The atmospheric air is admitted through pipes which are led in from the top of the tower through the stuffing boxes, and the height of the air inlet over the lower water level can be adjusted by a manoeuvring gear from the top. This lifter pumps about 11 cubic feet of water per second, and the lift varies from 4ft. up to 8ft. The lifter is connected by a 9in. air pipe line to the rarefier, and the two sets of apparatus are about 500ft. apart. This plant drains the town of Bambanwala and some thousands of acres which had to be abandoned on account of water-logging. After six weeks of operation the ground water level had been lowered sufficiently to save the town and to bring back the land to cultivation, and the total expenditure for the plant is something like £900. There are three similar plants on the same canal.

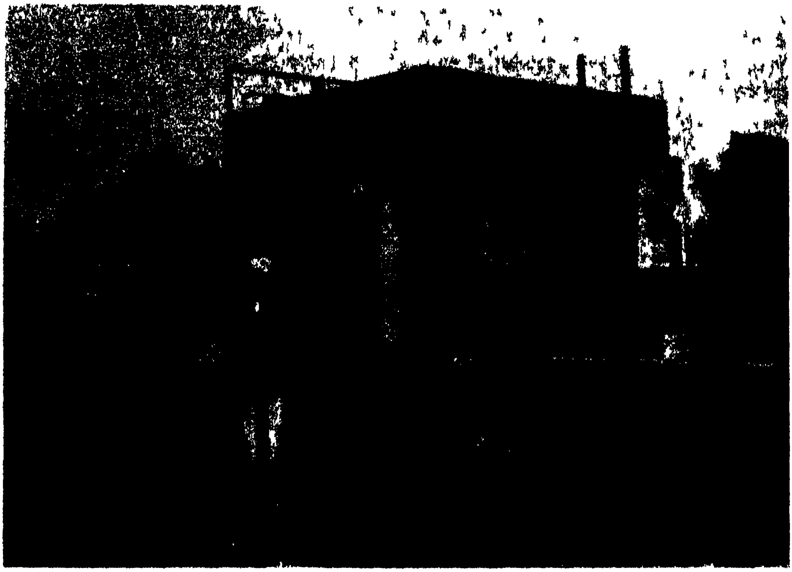


Upper Chenab Canal, Punjab, India, shewing two Hydrautomat Rarefiers at the ends of the regulator

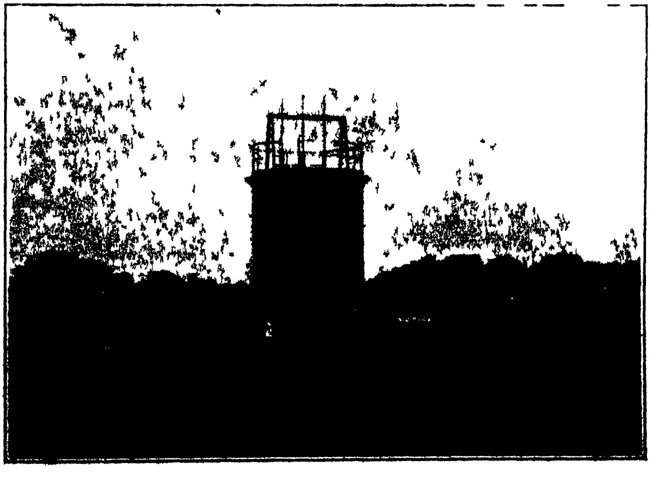
The next plant to be described is on the *Lower Jhelum Canal* in North West India, and consists of the Hydrautomat Compressor as shown on Fig. 17, to which are connected by air pipe lines 8 borehole wells, each 1000ft. apart. This plant is pumping up underground water for irrigation. The design and construction of the Compressor are rather interesting, as the whole affair is sunk as a caisson in alluvial ground, whereby the compressor pipes are formed as tubes in the very walls of the circular caisson.

As will be seen the dimensions are considerable. The diameter of the caisson is 33 feet and the depth of the shoe below the surface is 72 feet. The operating head is 8ft. 2ins. and the degree of compression is 48 feet.

The pumping plant is shown by Fig. 18. Each borehole well has two lift pipes. This method has been chosen because there are great fluctuations in the level of the underground water, and sometimes only one pump will be in operation, and at other times both, when they again may work either in parallel or in series. Each well pump has a capacity of 2 cubic feet of water per second, with a lift varying from 14ft. to 34ft.



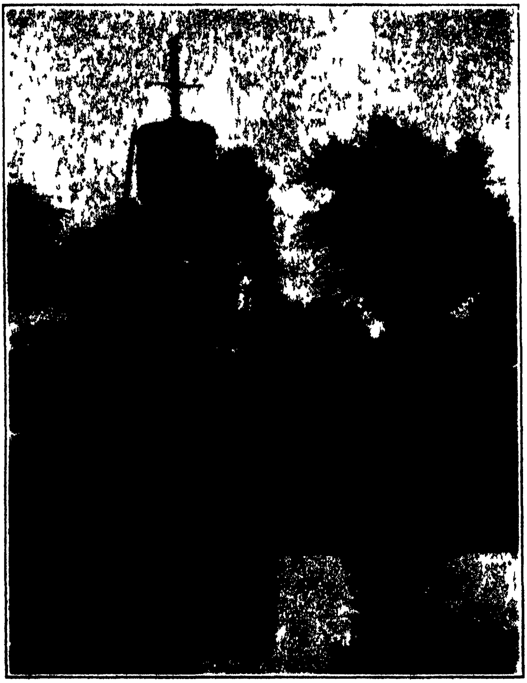
Hydrautomat Rarefier at Chianwali, Punjab, India



Hydrautomat Lifter made in brickwork.

This plant shows how beautifully flexible the Hydrautomat system is. The compressed air can be used as power transmitted within reasonable distances, and as the apparatus is so extremely simple and rugged, and as no attention is required, the running cost is practically nil.

The next Hydrautomat to be shewn is being built on the Rio Ebro in Spain, not far from Saragossa. Here again the combination of Hydrautomat Compressor and Air Lift Pump is used, but the conditions in this case are rather difficult to meet, as the water has to be pumped up to three terraces, having levels 30ft., 45ft. and 60ft. above the river.



Hydrautomat Lifter made in Steel.

Fig. 19 shows the design of the plant. An old dam exists across the river, built by the Moors, and on the side is a millrace which is now used as an intake for the Hydrautomat. There are four compressor shafts opening out into the air separator at the bottom—all excavated in the rock, and afterwards lined with concrete. The head is only 6ft. and the available operating water about 100 cubic feet per second. The air is compressed to 15lbs. per square inch above atmospheric pressure. The water is lifted in 4 stages, each 15ft. It is necessary

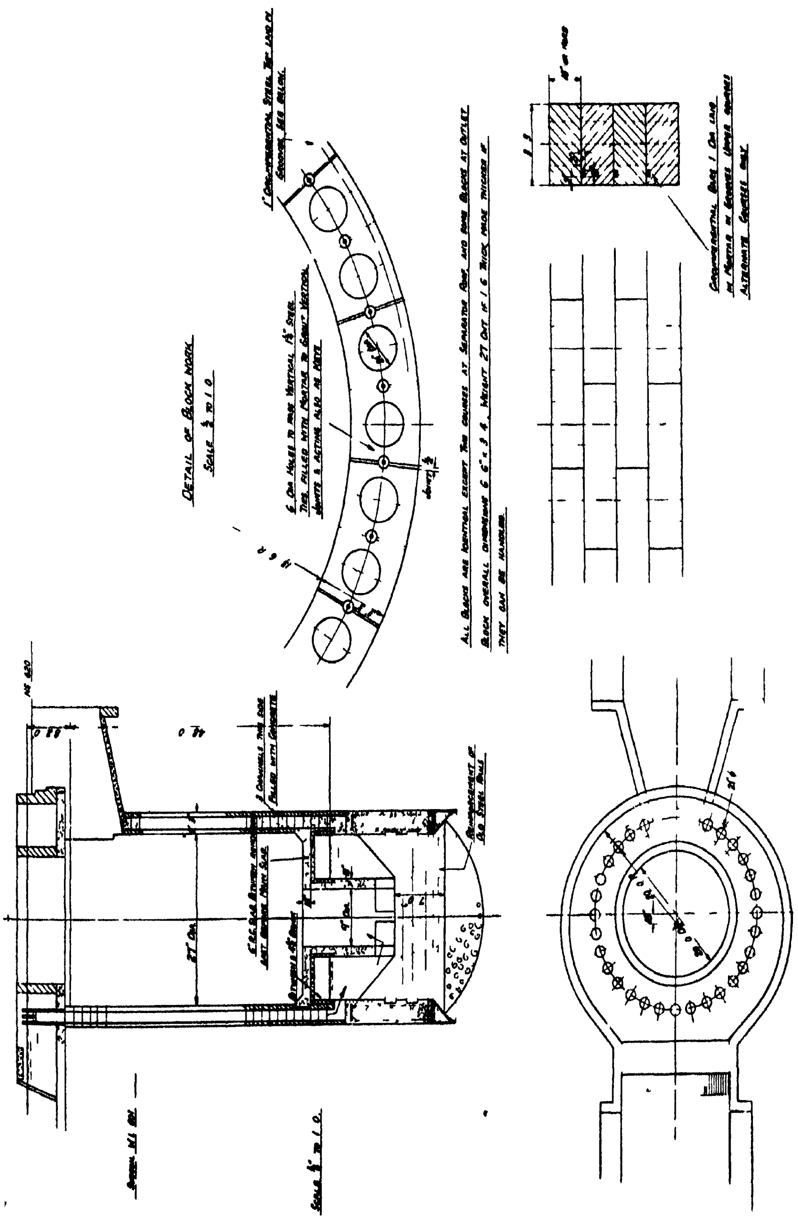
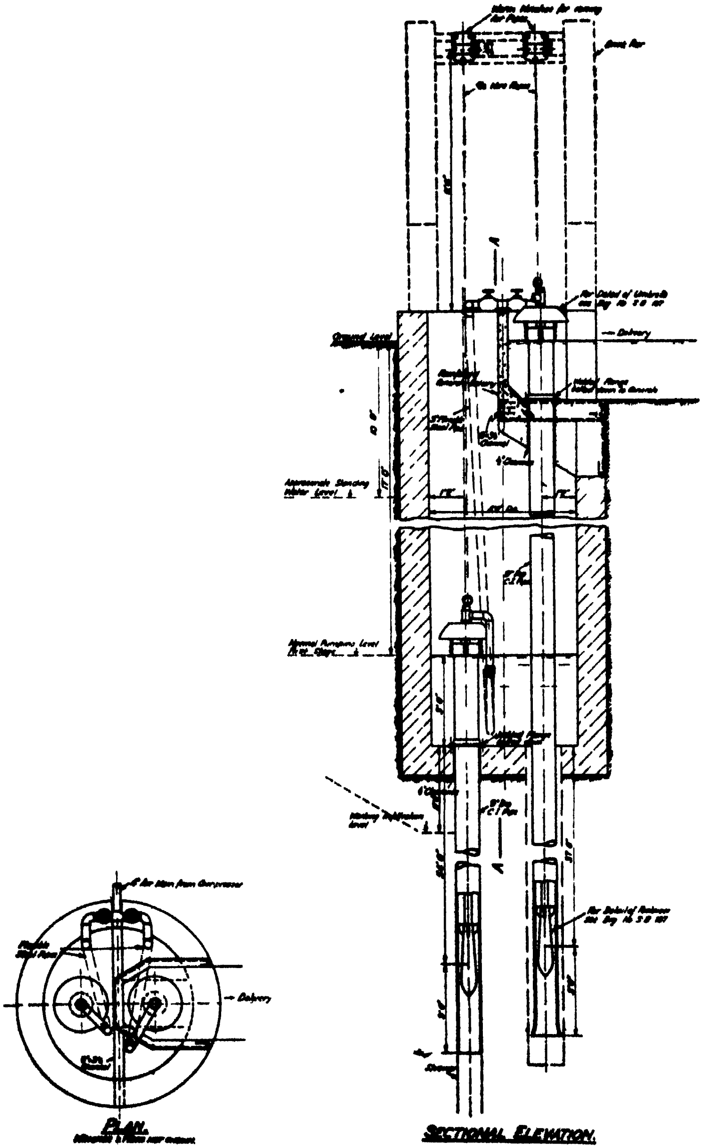

Detail of Block Work
Scale ½ to 1 0
1" Circumferential Steel Tie laid in Grooves, see below.
6 Dia Holes to take Vertical 1½" Steel Ties, filled with Mortar to Grout Vertical Joints & acting also as Keys
Joints ½
All Blocks are identical except two courses at Separator Ring and some Blocks at Outlet.
Block overall dimensions 6 6" x 3 4. Weight 27 Cwt if 1 6 thick, made thicker if they can be handled.
Circumferential Bars 1 Dia laid in Mortar in Grooves Under courses Alternate Courses only
42 0
2 Channels this side filled with Concrete
27' Dia
R.C. Slab Between Ring and Bottom Main Slab
Bitumen 2½" Thick
9' Dia
Reinforcement of Old Steel Rails
Section
Scale ¼" to 1 0.

FIG. 17.



PLAN.

SECTIONAL ELEVATION.

FIG. 18.

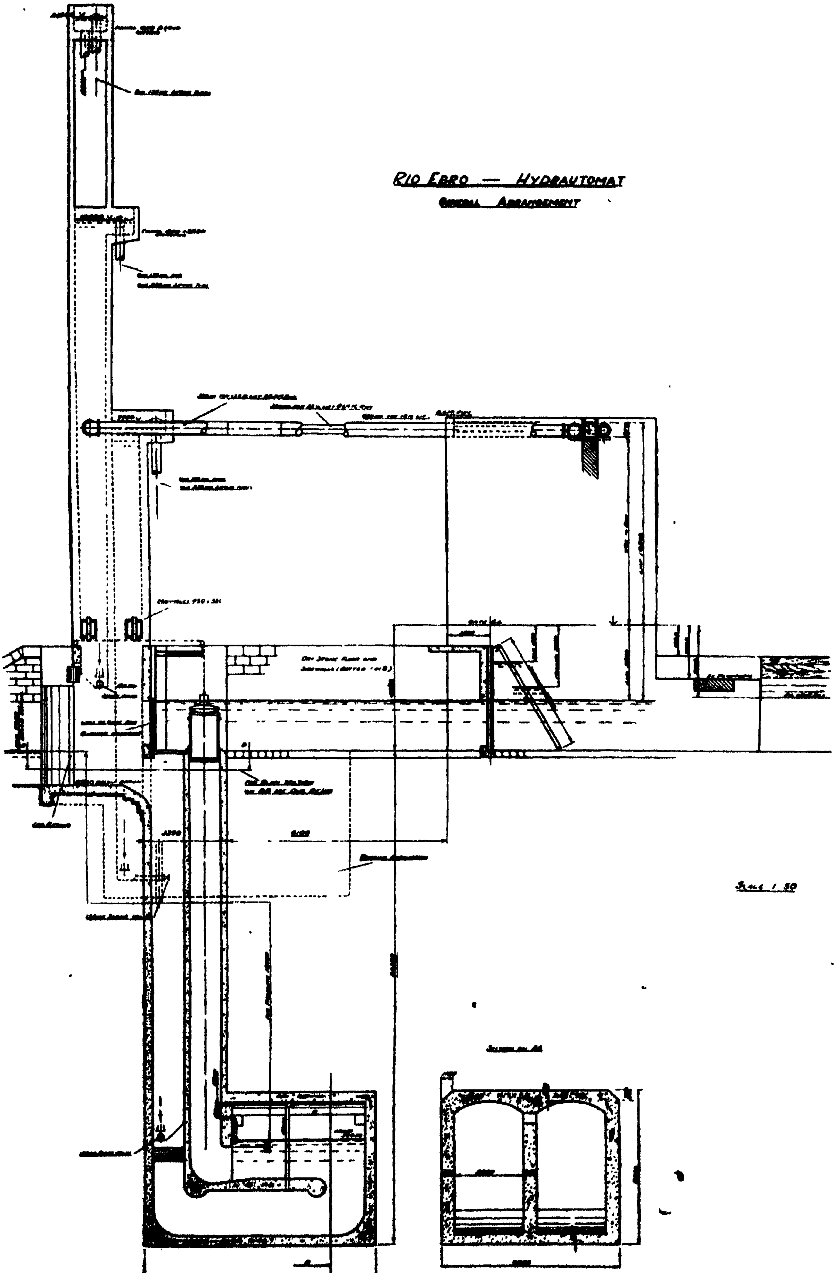

RIO EBRO — HYDRAUTOMAT
GENERAL ARRANGEMENT
SCALE 1/50
SECTION ON AA

FIG. 19.

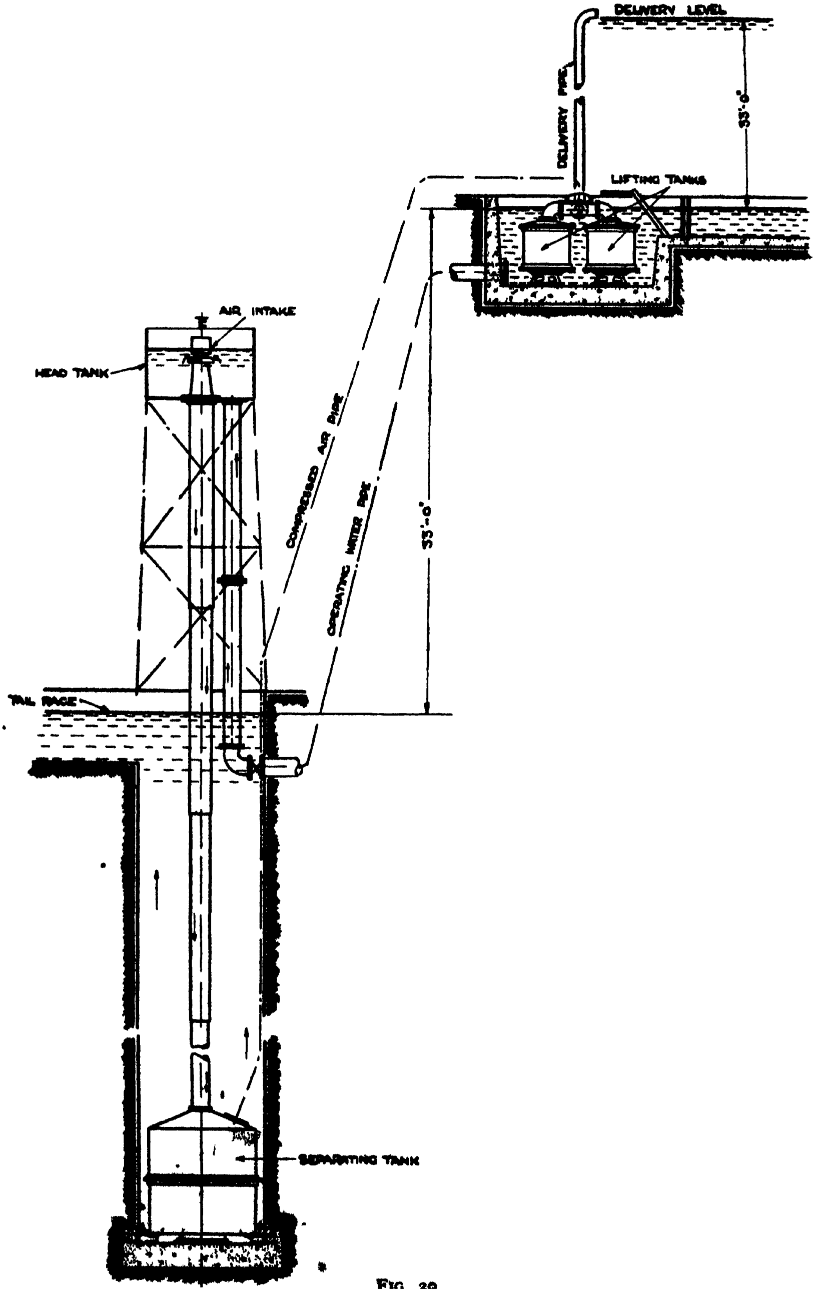

DELIVERY LEVEL
DELIVERY PIPE
33'-0"
LIFTING TANKS
AIR INTAKE
HEAD TANK
COMPRESSED AIR PIPE
OPERATING WATER PIPE
33'-0"
TAIL RACE
SEPARATING TANK

Fig. 20

to divide up the capacity into several pipes, because when the water is lifted up to the maximum height of 60ft. a correspondingly smaller amount of water can be pumped only, and in this case only one pumping pipe in each stage operates, whereas when the water is supplied to the first level, three pipes are working in parallel. The capacity of the plant is 50 gallons per second for the first stage, 38 gallons for the second stage, and 25 gallons for the highest lift. The plant is built entirely by local labour and foremen.

Fig. 20 demonstrates a combined compressor and displacement Hydrautomat as installed for a tin mine in Nigeria, where the tin is found in the alluvial deposits on the river banks, and the method of mining is to sluice down these banks with water. The rivers have a very gradual slope only, and it is therefore difficult to get the water high enough up on the bank by level channels. Such Hydrautomats as illustrated have proved very useful for the purpose. The operating head and the lift are in this case identical, namely 33ft. The compressor is built of steel pipe, and the separator tank is also in steel. The air, which has a pressure of 18lbs. per square inch, is conveyed by piping to the water lifters, which are 1400 feet away. The displacement tanks are built entirely in steel and cast iron, but the operation is the same as indicated previously. The apparatus lifts 2½ cubic feet per second.

It may be worth while to mention another development, which although not a combination of hydraulic and pneumatic action, is an offshoot of the developments described above. Fig. 21 shows a diagram of the *Static Hydrautomat* apparatus which uses directly, statically and automatically the power in a low head of water to lift a small amount of water to a great head. Thus this apparatus has the same field as the hydraulic ram, with this distinction, that it can be built for a larger capacity than the ram ; that it gives a very high efficiency under all conditions, namely, well above 70 per cent., and that it works entirely without any shock—which admittedly is a serious drawback in rams under certain conditions.

The Static Hydrautomat consists of low pressure and high pressure pistons directly connected, and an automatically operated distribution valve, sending the water into one side of the operating cylinder, whilst connecting the other side to the suction pipe which dips into the tail race. A suitable relay mechanism is provided so that it is not possible for the apparatus to stop at any dead point. The high pressure piston and cylinder work exactly as an ordinary reciprocating pump in connection with the reflux valves. This apparatus will lift water to 400 feet or more when utilising a head of 10 feet only.

In the foregoing, systems and apparatus have been described which are in successful commercial use.

There is a wide field for applying these ideas to other uses, not yet fully explored.

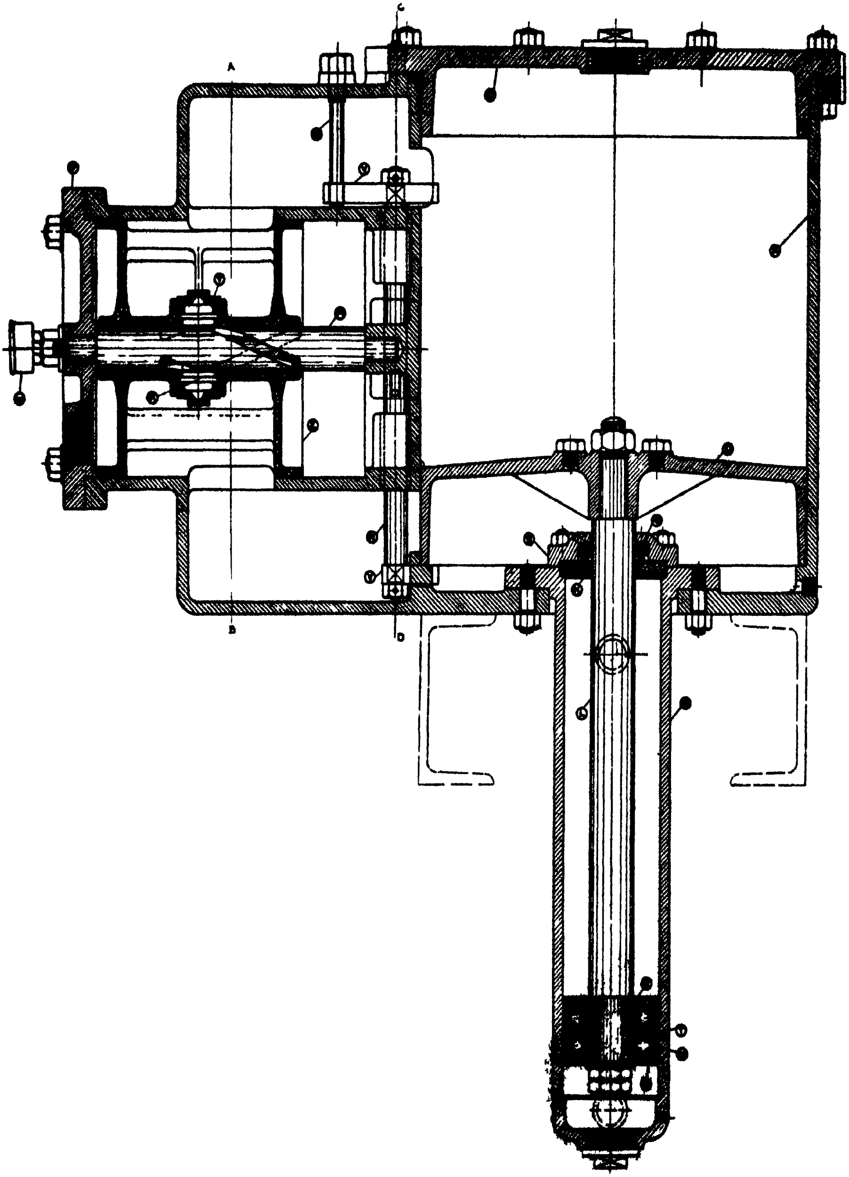


FIG. 21A.

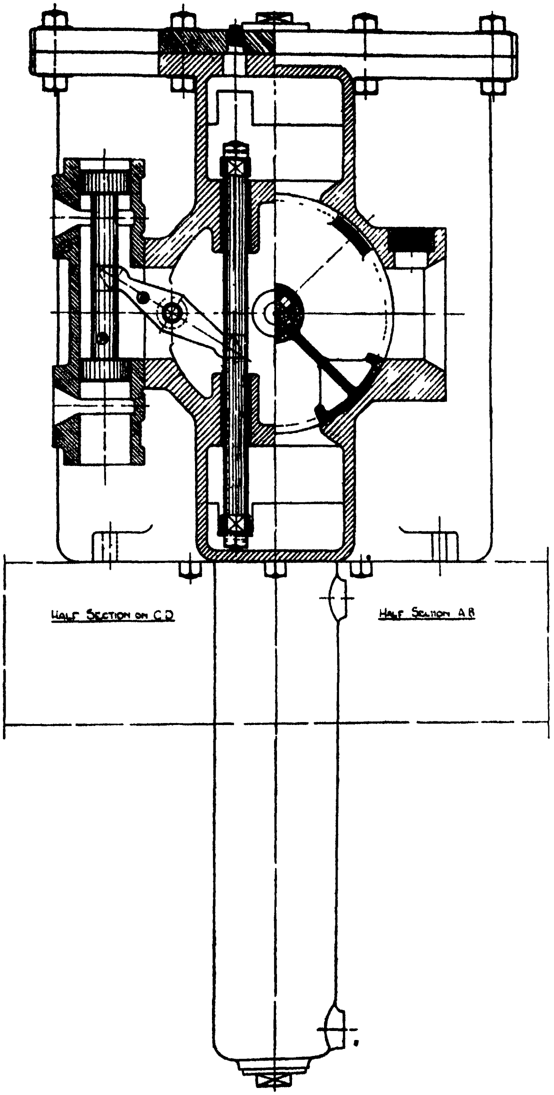


Fig 21b.

DISCUSSION

Sir Oliver Lodge, F.R.S., said that his attention was first drawn to an apparatus for raising water to a fairly high level—an apparatus brought out by his friend, Mr. T. G. Allen, and named by him a " hydrautomat." This apparatus excited his interest very considerably, and he went carefully into the mechanism. It seemed to him to work very well. It had not been mentioned by the lecturer, and he gathered that it had been superseded by other devices which, if not more efficient in the ordinary technical sense, were, as the lecturer had suggested, more practically efficient from the point of view of economy in working, and so on. This apparatus differed from some of the devices described that evening in that it was static. In the last of the figures shown by the lecturer, there appeared to be some approximation to Mr. Allen's hydrautomat. It reminded him of the feeding of a boiler by using steam, which occupied a big volume, to force into the same chamber water which occupied a small volume.

He always admired with an almost superstitious veneration the applications of the principles of physics which were made by engineers. Engineers had an instinct or facility for doing these things on a large, permanent, and paying scale, which physicists could only attempt on a ridiculously small scale in the laboratory. The transition was very striking, and the way in which this thing had grown in the lecturer's hands was quite astonishing ; but he felt a little difficulty of a theoretical kind on which he would like the opinion of the Chairman, though he feared that it was so elementary that he might not care to look into it.

The lecturer, instead of using a static method, where the water and the air might stand still if one pleased, or be allowed to go on, if one pleased, used a method which would not work at all unless there were a state of flow. The whole thing depended in all cases on the difference in weight between air and water. Water was 800 times heavier than air. If, therefore, the compression rose to 800 atmospheres, none of these things would work, because the air would then weigh the same as the water. The whole point was that a column of water was being balanced against a column of mixed air and water, and because the air did not weigh anything it could be used to do work. Mr. Allen's device was a kind of air-compressing machine ; it was really a kind of water staircase. A very little drop raised the water by so much, another drop raised it further, and so on. It went up step by step, never compressing the air much, but raising the water simultaneously as high as one chose to make the staircase.

The method expounded that evening was different. Here the work was done with bubbles, and he had to say that he was not happy about those bubbles. He spoke with diffidence because of the fact that works on this principle had been installed on a large scale and were efficient. Therefore, he was not complaining or criticising, he was trying to learn. (Sir Oliver Lodge here drew on the blackboard a representation of a U-tube, with water in one part of the tube and bubbles in the other). He said that the lecturer had spoken of the specific gravity of the foam as compared with the specific gravity of the water. He would not deny that the action could be expressed in that way, but it seemed to him that the bubbles must be rising, and that bubbles when they rose dragged up a little of the water with them. Every bubble, going up, dragged the water with it after a fashion, but not very efficiently. If the bubble filled the whole tube the action would be like that of a piston ; here some of the water was replaced by air, and the water and air were balanced even when standing still ; in other words, instead of using bubbles to raise the water, one might use something like pistons to raise the water. In the original static hydrautomat this was what happened, and he would have thought that arrangement to be more efficient than the arrangement demonstrated in the lecture, although it might be a little more complicated. In most hydraulic engineering one avoided making splashes and having foam and white water, one kept to blue water, but here, ingeniously and surprisingly, the foam was used in order that afterwards when it had done its work the water and the air might be separated, the water thrown away, and the air, now unde rcompression, taken to the point at which it was desired to work it; it then became like the transmission of power, and could be used for any purpose desired, including the pumping of water at a distance.

His contribution to the discussion consisted, therefore, in calling attention to Mr. Allen's old static invention, expressing surprise and admiration at the developments which had been the outcome of that invention, the large scale on which it had been possible to work it, and in asking whether what he had said about the foam and its comparative inefficiency had any value or not.

Sir Atul Chatterjee, K.C.I.E. (High Commissioner for India), explained that he was neither a scientist nor an engineer, but he was intensely interested in the condition of agriculture in his country, and he had listened with rapt attention to what had been described by the lecturer. He was acquainted to a very large extent with the country in the Punjab and in the United Provinces in the North of India, where irrigation canals were of immense benefit to the agricultural people. He was also acquainted with the disadvantages which arose from the souring of the land owing to too much irrigation, and he had been most gratified to learn that these difficulties could be overcome by the appliances and contrivances described in the lecture. It was particularly satisfactory to learn how cheap and effective they were.

Mr. Frank Twyman, F.R.S., said that his interest was in the manufacture of optical instruments, and therefore, at first sight, he had little to do with the subject under discussion. But he had been simply enthralled by the account of the work done in this way, and had wondered whether a device of this kind might be of more use in the laboratory in the initial stage of obtaining high vacua, than the water injector which was often used for this purpose.

He added that he thought technical men were often so engrossed in their own affairs as to neglect the ideas which came to them from other technical interests. A manufacturing friend of his had suggested that it would be a good holiday for a manufacturer if he could be set to manage—or mismanage—the works of people in quite a different sphere of industry; for instance, the optician might for a time manage a brewery! There was a good deal to be said for such a suggestion, although he did not know that the accountants of the firms concerned would quite approve of such an interchange of technical ability.

Mr. M. K. Rangarathan (Madras Government Public Works Department), who said that he had come over from France specially to be present at that meeting, expressed the interest which he had felt in reading in engineering journals about hydrautomats. He had had no opportunity of seeing any of them in operation in Northern India, but he had heard from other people who had been to see the installations that they were very satisfactory. He was thinking of making proposals to his local Government at Madras that similar systems should be introduced in Southern India.

Mr. T. G. Allen said that he was not a hydraulic engineer, and was, therefore, unfamiliar with the science of hydraulics. He did not propose, therefore, to expose his ignorance by discussing this scientific subject before an audience of experts. His only object in accepting the Chairman's invitation to speak was, in the first place, to congratulate Mr. Boving upon his able lecture, and also to express his admiration for the skill, ingenuity, and inexhaustible patience with which he had evolved these devices. Patience was a virtue which one did not always associate with the average inventor, though it was one which might be reasonably expected to be found in a man whose initials spelt "J.O.B." He was sure it was the wish of all concerned that this modern J.O.B. might in time reap that material reward which was once vouchsafed from heaven to his Biblical namesake!

He desired to say one word with regard to Sir Oliver Lodge's reference to himself. It was true that he once was guilty of perpetrating an invention by which water was made to raise itself without the employment of kinetic energy. It was also true that he christened that invention by the coined name of hydrautomat. But that invention had been superseded by the more practical inventions of Mr. Boving, and only the name survived to commemorate its one-time existence. If he were asked to draw the distinction between Mr. Boving and himself, he might say this, that he (the speaker), was the father of one child which died in its infancy; on the other hand, Mr. Boving had been the father of several healthy children who had now reached a vigorous maturity. He congratulated Mr. Boving upon his procreative faculties, and he hoped this virile father would live long and his progeny increase.

MR. A. S. E. ACKERMAN (Secretary, Society of Engineers), rose simply to make one small request, that when this paper was indexed, it should be under "Air Pumps." That would be the natural heading to which people would refer who wanted information on the subject.

MR. R. W. WESTERN remembered hearing about an invention of this kind some forty years ago, though his memory was not very clear at this distance of time. It was brought out in the early nineties at the McGill University in Canada. The difficulty resided in deciding the size of the bubble. If the bubble was too large it rose quickly and caused turbulence and loss of energy; if the bubble was too small it rose slowly, and there was difficulty in disengaging the gas from the water, involving a separation chamber with increased capital cost. His own recollection was that this consideration weighed very heavily with the Toronto engineer. From what he had learned that day it seemed that these difficulties had been overcome. He supposed that there had been a great deal of work done in deciding the optimum size of the bubble on which success depended.

MR. W. C. CHOPRA (Superintending Engineer, Punjab Irrigation), had been interested to hear about the working of this plant in places with which he was concerned, particularly Bambanwala on the Upper Chenab Canal. As an engineer of that province, and one who had had experience of this contrivance, he would like to ask a practical question. The lecturer had spoken of its high efficiency. But he understood that at Bambanwala the efficiency was as low as 3 per cent. Could the lecturer give any confirmation of that? He also desired to know the limitations of transmission, and the length over which operations could be carried.

MR. J. S. MARLOW, taking up Sir Oliver Lodge's reference to the size of the bubble, said that he took it the efficiency depended on the design of the injector and the injector action of the air in the water. He also wished to know if it was possible to get a constant stream with the air-lift system instead of a spasmodic one.

The Chairman expressed his admiration at Mr. Boving's extraordinary versatility in making so large a number of combinations as he had done—air, water; water, air; pressure air, vacuum air; pressure water, water under diminished pressure—all interchanging with one another, making variations of power in any kind of combination required. It was an extraordinary example of the advantage of an exact understanding of the scientific basis of the problem. Mr. Boving was a Swede, and with that practical ingenuity for which Sweden was famous, aided as it was by his own training at the University of Stockholm, he had been able to do these very wonderful things.

In the observations made by Sir Oliver Lodge, he had felt inclined to correct him, or rather to try and remove his dislike of these bubbles which were rising up through the water, and which he seemed to think, were missing their vocation. If Sir Oliver Lodge would think further about the matter, he would see that a bubble turned loose in water very quickly came to a steady rate of rising in the water. The moment it had arrived at that stage it induced on the water in which it was rising a lifting force exactly equal to its own buoyancy. That was the case with bubbles of any size; as long as they were lifting themselves freely from water they were having the effect, not of giving a continuous column of water or stationary water, but a column of water in which at every point the air was giving a "push-up," and producing the effect of diminished specific gravity as soon as there was uniform velocity through the water.

Sir Oliver Lodge said that that was the kind of helpful exposition he would have expected from the Chairman. He thought that Mr. Boys had illuminated the subject. If what he said was true that the effect of this dragging of the bubbles as they went through the water was just equal when it reached the terminal velocity of the rise to the buoyancy of the water, so that the two were at equilibrium—and he thought this must be so—then he had solved the problem. He was very glad that he had asked the question, because it had elicited this explanation from the Chairman.

The Chairman, continuing, said that he thought the most surprising and most ingenious of the things which Mr. Boving had elaborated was the method by which he controlled the passage of the river over a weir. It was a most unexpected way of dealing with the problem, but it came down merely to turning on and off a gas tap

There was one other observation he wanted to make at the risk now of offending Mr. Allen, namely, that the word "hydrautomat" was an admirable word derived from the Greek, and one which explained itself fully when one thought of its derivative terms. But long words derived from Greek or Latin did not trip lightly off an English tongue, and a word was wanted to cover the whole range of Mr. Boving's inventions which would be more English in character, belonging more to the vernacular. For his own part, he would call the whole series "Froth engines." Anybody could remember the term "froth engines," and it had not been used before, so that it would serve to stamp the whole of Mr. Boving's work and identify it.

Mr. Boving, in replying on the discussion, referred first to the effect of the bubbles on the water. If, in a compressor, there were too large bubbles they might even go round in a circle in the water, and thus, although there might be the requisite amount of air to make a balance with the other column, there would not be the requisite compression. It was necessary, therefore, to have smaller bubbles. The bubble tried to escape, and found a form for itself which offered the least resistance to the water. In doing so it slipped through the water and did too little work—another reason for not having too large bubbles in pumping water.

Mr. Western had asked the size of the bubble. Generally speaking for a compressor the bubbles must not be too small. The ideal would be to have infinitely small bubbles and a large separation chamber, but this was not commercially possible. It had been found that for low head compression, bubbles of the size of half-inch diameter were satisfactory. For high compression one could have larger bubbles at the in-take, because they got squeezed so very small when they came down.

Sir Atul Chatterjee had mentioned the plant at Bambanwala. That plant cost about £900.

Mr. Twyman mentioned high vacua. It was not possible to obtain such high vacua by this method as with the water injector. With the water injector very high vacua indeed could be obtained.

Mr. Marlow had spoken about the injector action on the air in the water. That was a wrong idea. If there was an injector in the water with any great velocity there was a great loss in efficiency too. The conditions for successful operation for the compressor was that the air entered into the water as quietly as possible without disturbance.

Mr. Chopra from the Punjab had made some very pertinent remarks about the Upper Chenab Canal. The first plant was put in two years ago. The efficiency was extremely low in the beginning. In his paper he had mentioned the efficiency for the compressor alone and for the water-lifter alone, and had given an efficiency of 50 to 60 per cent. for the compressors. Those were proved facts. In an air-lifting plant 60 per cent. efficiency had been measured under favourable conditions. When the first plant was put in on the Upper Chenab Canal he was groping in the dark. Certain conditions were laid down by the engineer, and the syphon put in to meet the engineering conditions had an efficiency of probably not more than 15 per cent. The efficiency of the lifter was about 25 to 30 per cent., so that if the two figures were taken together one had a resultant efficiency of something like 3 per cent. However, that plant had been re-built, and the efficiency had been raised to 8 per cent. In a second plant the efficiency was 12½ per cent., and in a third plant 22 per cent.—that is $\frac{df}{DF}$ actual foot lb. in the operating water to foot lb. in the pumped water.

A vote of thanks to the lecturer was carried unanimously.

EXHIBITIONS OF APPLIED ART

British Institute of Industrial Art Exhibition. At the Victoria and Albert Museum. 9th November to 18th December. The present exhibition is divided into three parts. One part is composed of the B.I.I.A. permanent collection; the second, of Mrs. Margaret Bulley's private collection; the third, of newly assembled wares "for the slender purse." The prices of most of these are marked; but they do not always offer much encouragement to the purse that may feel itself fairly described as "slender."

The bulk of modern art and craft productions have a singular correspondence with the more obvious and popular human ideals of the present day, both physical and moral. They have much in common with those clean-cut male physiognomies which figure in advertisements and in illustrations to magazine stories. They are somehow healthy and in a certain sense wholesome; only far more rarely are they æsthetic. The finish given by machinery is apt to be *superior* and superior is just what works of art are not.

But that the B.I.I.A. is exercising an active and most valuable influence has been clear before this. The average quality of goods displayed is a high one, and if these goods are not cheap, they are not expensive either. Take Messrs. Peter Jones' furniture in weathered oak. The design is not inspired, but—wholesome, and the price is reasonable. Messrs. Wedgwood's table of pottery No. 197, is one of the most impressive assemblages. Here the slender purse rather begins to wilt, for the charming celadon ware set, 197P, turns out to be as inaccessible as it is desirable. The little toast rack itself is five shillings and twopence. But the cream ware, on the other side, is attractive, sensible and cheap ; the slender purse recovers its spirits.

Textiles are, as usual, good. Pots and pans, good. Printing, colour printing, book production, map production, all most competent

And then we come to Mrs. Bulley's collection.

At once we are conscious (or we ought to be), of a more rarified, a more bracing atmosphere. It is true that almost the first thing that strikes one is a carpet design by McKnight Kauffer in this artist's least happy manner. But the next moment we are confronted by Duncan Grant's table, dating from Omega Workshop days, but none the less masterly for that. Grant's design for a chair cover, worked by Mary Hogarth, is probably more recent ; how rich and how assured it is! Perhaps the most fascinating single object in the whole exhibition is Grant's stove, or more accurately, his tiles for the stove, No. 582 ; the stove itself is admirably designed by Robert Medley. We cannot, alas, expect that modern industry will be so to speak " converted " by a man of however powerful genius, yet it is to be hoped that a sense of Grant's importance will grow increasingly both on our captains of industry and on their men. He has reasserted, with an eloquence all his own, first, the supremacy of good proportions, secondly, the doctrine that the details must be subordinated to the whole.

Raoul Dufy's cretonnes, especially those printed in blue on white, are excellent, and so are the textiles shown by Phyllis Barron and Dorothy Larcher. Marion Richardson's " young pupils " are evidently gifted. See especially case 569

The Permanent Collection may just now have the opportunity of attracting some of the attention it always deserves. Alan Durst's ivory cross is a design which seems to embody with curious thoroughness certain modern virtues and with them, their defects. Can we still blame the first shock of mechanisation for the readiness with which our craftsmen let discipline pass into a rather unsubtle mannerism ? What a fine artist Eric Gill would be if his manner did not overshadow his matter !

The exhibition is open every day, normally 10 till 5, but on Thursdays and Saturdays 10 till 9 ; Sundays, 2.30 till 6.30. It should give us all our inspirations for Christmas presents. The organisers did not forget to include toys in their catalogue.

NOTES ON BOOKS

PARIS AND LONDON IN 1815. By P. R. Broemel, F.R.S.A. London : Murray and Co. 5s.

Here is a lively and entertaining little book, full of stories about the personalities of the Waterloo period, at home and abroad. It was an age of exquisite snobbery, in which the rich and powerful behaved most barbarously with an air of being unspeakably refined. On the whole it was at least not an age of humbug, and the great made comparatively little concealment of their more devastating whimsicalities. The Duke of Wellington must be much nicer as a legend than he was to meet.

Mr. Broemel whisks us merrily from the one capital to the other, introducing us to all the rakes, dukes, duellists and demi-mondaines, whispering into our ears all the scandals told about them, and many of the *bons mots* said to have been made by them. We find writers and artists also in his pages ; but was Horace Vernet really a " glorious example " of what the French School could produce ?

That most unsympathetic of heroes, Napoleon, seems to have had one thing in common with his conqueror : a lack of attractiveness for women. His manners were unkind, he was neither a gentleman nor one of " nature's gentlemen." But consideration for others was hardly a characteristic of the *beau monde* that despised and feared him.

The effect of that other Great War on society had been corrupting—naturally. Democratic sympathies were still hardly possible for the people who mattered, and even the way peace was kept for the next forty years does not seem decent to a more liberal posterity. The folk who danced at Almack's and risked their fortunes at the *Salon des Etrangers* were, though they did not know it, celebrating the end of a régime. One hopes there will always be enough money and leisure for those who want to be absurd to have at least a part of their heart's desire, but that these should have been practically identical with the arbiters of the world's destiny was a misfortune, the depth of which Mr. Broemel's little book helps to illuminate.

THE D.I.A. CAUTIONARY GUIDE TO ST. ALBANS. London: The Design and Industries Association. *6d.*

The general public is to this day far more diffident about criticising architecture than about criticising pictures. The lighter side of building is hardly recognised : people find houses noble, beautiful, squalid, ugly, but not *absurd*. Yet many are nothing more nor less than absurd. Streets are often ruined by individual houses that are not so much Calibans in the wrong place as clowns or mountebanks in the wrong place.

When Mr. and Mrs. Williams-Ellis tried to cure the-man-in-the-street of this particular inhibition by writing a book, they called the book " The Pleasures of Architecture." A very good title, calculated to suggest that it is not always necessary to be solemn about stone and brick. It is Mr. Williams-Ellis who writes the Foreword to the present Guide—and perhaps provides the page-headings and titles to the illustrations.

These photographs are really excellent. " First depressions on arrival," pages 6 and 7, show with what single-minded loyalty to their clients the advertisers of to-day do their work. But man cannot live by petrol and Sunlight Soap alone : see the next two pages. Page 9 makes one feel, not for the first time, that Mr. Woolworth's goods would be just as welcome if he happened to become a convert to æsthetic shop-fronts.

And so on. Page 23 is interesting ; it represents a fine new block of offices in red brick, and a printing works which seems to be in concrete, both buildings being dignified and restrained. (Opposite we see a public convenience in the Tudor style, half timber and all !)

One feels that every old town in England ought to have its own Cautionary Guide, and that every inhabitant should have a copy of the one relating to his home.

GENERAL NOTE

The Leon Gaster Memorial Fund.—Nearly two years have elapsed since the death of Mr. Leon Gaster, Founder, Vice-President and Honorary Secretary of the Illuminating Engineering Society, and there is a strong desire among members of that Society to commemorate in a fitting way the great services which he rendered to the Society and to Illuminating Engineering during nearly twenty years. The Council of the Illuminating Engineering Society has concluded that there is no better way of doing this than by linking Mr. Gaster's name with some scheme which will further the aims which in his lifetime he strove so zealously to foster, namely, to increase the reputation of the Society, to stimulate a high standard in the papers and contributions which are submitted to it, and to encourage experiment, research and investigation.

It has accordingly been decided to institute a "Leon Gaster Memorial Fund." It is proposed that a fund of not less than £200 shall be collected, the interest on which shall be devoted primarily to the establishment of a Premium to be awarded annually for the best contribution from a subscribing member of the Society on any aspect of Illuminating Engineering which is submitted to the Illuminating Engineering Society during the year It is proposed that the Premium should be used for the purchase of books, instruments or apparatus, as the recipient may desire, and that it should be accompanied by a certificate on vellum recording the award. It is hoped that the requisite fund will be collected and the necessary Trust completed in time for the first award to be made in 1931. Promises of contributions to the Fund ranging from 5s. to £5 5s. have already been received.

The late Mr. Gaster was a member of the Royal Society of Arts for over 30 years and read at meetings of the Society a number of papers and lectures on subjects connected with Illuminating Engineering. It is thought that there may be Fellows of the Royal Society of Arts who may wish to associate themselves with the movement to establish a permanent memorial of his work.

Contributions or promises should be sent to the Honorary Secretary (Mr. J. S. Dow, 32 Victoria Street, London, S.W.1.) Cheques and Postal Orders should be made payable to the Illuminating Engineering Society, and crossed "A/c Leon Gaster Memorial Fund."

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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Monday, December 2..Automobile Engineers, Institution of, at the Merchant Venturers' Technical College, Bristol. 7 p.m. Dr. B. P. Haigh, "The Relative Safety of Mild and High-Tensile Steels under Alternating and Pulsating Stresses."

Electrical Engineers, Institution of, at the University, Edmund Street, Birmingham. 7 p.m. Mr. R. A. Chattock, "The Modern Use of Pulverized Fuel in Power Stations."

Geographical Society, at the Aeolian Hall, New Bond Street, W. 8.30 p.m. Mr. O. M. Tweedy, "The Central African Highway."

University of London, at Bedford College, Regent's Park, N.W. 5.15 p.m. Prof. W. Meyer-Lübke, "Les Origines Historiques des Langues Romanes." (Lecture I).

At King's College, Strand, W.C. 5.30 p.m. Dr. H. C. Barnard, "The Education of Girls in France under the Ancien Régime." (Lecture III).

At King's College, Strand, W.C. 5.30 p.m. Rev. C. F. Rogers, "Ecclesiastical Music. Lecture III—Some Welsh Hymns."

At the London School of Economics, Houghton Street, W.C. 4.30 p.m. Mr. E. H. Warmington, "The Debt of Medieval Explorers to Ancient Discoverers." (Lecture III).

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. P. Vaucher, "L'Ecole Libre des Sciences Politiques."

At University College, Gower Street, W.C. 2 p.m. Miss M. St. C. Byrne, "England in Shakespeare's Day. Lecture VIII The Theatre in Elizabethan London"

At University College, Gower Street, W.C. 5.30 p.m. Miss E J. Davis, "How London became the Capital of England." (Lecture III).

Victoria Institute, at the Central Hall, Westminster, S.W. 4.30 p.m. Sir Ambrose Fleming, "The Garden Tomb at Jerusalem. A Possible Site of the Resurrection."

Tuesday, December 3 . Anthropological Institute, 52 Upper Bedford Place, W.C. 8.30 p.m. Mr. A. L. Armstrong, "Report of Excavations in the Cave of Bambata and at the Victoria Falls, South Rhodesia, 1929."

Automobile Engineers, Institution of, at the Royal Society of Arts, Adelphi, W.C. 7.45 p.m. Mr. J. B. Hoblyn, "Aluminium Alloys from the Users' Point of View."

Chadwick Public Lecture, at Inner Temple Hall, E.C. 8.15 p.m. Dr William A. Robson, Barr.-at-Law, "Public Health Law and Administration."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m.

Electrical Engineers, Institution of, at the North British Station Hotel, Edinburgh. 7 p.m Informal Meeting.

Empire Society, at the Hotel Victoria, Northumberland Avenue, W.C. 8.30 p.m. Sir Richard Gregory, "Science and the Empire."

Quekett Microscopical Club, 11 Chandos Street, W. 7.30 p.m. Mr. Montagu A. Phillips, "British Wild Life."

Television Society, at the Engineers' Club, Coventry Street, W. 8 p.m. Mr. E. G. Lewin, "Television: Some Suggested Schemes."

University of London, at Bedford College, Regent's Park, N.W 5 15 p m Prof W Meyer-Lübke, "Les Origines Historiques des Langues Romanes" (Lecture II)

At King's College, Strand, W C 5 30 p m Prof Sir B Pares, "Russian History to 1861 Lecture VIII —The Time of Troubles"

WEDNESDAY, DECEMBER 4 Analysts, Society of Public, Burlington House, W 8 p m (1) Lecture by Professor Dr A P Laurie, on 'The Methods of Examining Pictures." (2) R I Andrew, "The Determination of Minute Amounts of Iodine in Soils and Waters" (3) Dr S Glasstone, and Mr J C Speakman, "The Quantitative Analysis of Mixtures of Nickel and Cobalt"

Civil Engineers Institution of, Great George Street, S W 6 30 p m Mr H A P Hetherington, "Well Boring"

Electrical Engineers, Institution of, Savoy Place, W C 6 p m Mr G Shearing and Captn J W S Dorling, "Naval Wireless Telegraphy Communications'

At the Technical College, Derby 6 45 p m Lt Col H. E. O'Brien, "Electric Traction"

Geological Society, Burlington House, W 5 30 p m

Goldsmiths Company's Lecture, Goldsmiths' Hall Foster Lane, E C 7 p m Mr Howard Robertson "Modern Design and Decoration

Heating and Ventilating Engineers, Institution of, at Swedenborg Hall, 29 Hart Street, Bloomsbury, W C 7 p m Mr R C Ching, "Costing Methods for Heating Engineers'

Industrial Psychology, National Institute of, at the Royal Society of Arts, Adelphi, W C 5 30 p m (1) Dr A Macrae, 'Interest and Aptitudes" (2) Mrs Milner, 'Temperament (3) Mrs Raphael, 'Personal Problems"

Literature, Royal Society of, 2 Bloomsbury Square, W C 5 15 p m

Mechanical Engineers, Institution of at the Hotel Metropole, Leeds 6 30 p m Dr H E Merritt, "Practical Aspects of Worm Gearing

Metals Institute of, at Thomas' Café, High Street, Swansea 7 p m Mr G Crift, 'Coke Carbonization and Bye-Products"

Microscopical Society, 20 Hanover Square, W 8 p m Meeting of the Biological Section

North East Coast Institution of Engineers and Ship builders, at Bolbec Hall Newcastle upon Tyne 7 15 p m Mr R Muntoir Pulverized Fuel Past and Future'

Public Health Royal Institute of 37 Russell Square W C r 4 p m Dr Alfred C Jordan Dress in Relation to Health and Disease

University of London, at King's College, Strand W C 5 30 p m Madame Aino Kallas, 'Modern Esthonian Literature Lecture III—Friedebert Tuglas"

At the London School of Economics, Houghton Street, Aldwych, W C 5 p m Prof A P Higgins, The Development of International Law in relation to Neutral Rights at Sea"

At the London School of Economics, Houghton Street, W C 6 p m Lecture IX on "Office Machinery

At University College, Gower Street, W C 5 30 p m Mr A M Wijk, "The Reformation Period in Sweden (Lecture II)

THURSDAY, DECEMBER 5 Auctioneers and Estate Agents Institute, 29 Lincoln's Inn Fields, W C 7 30 p m Mr W S. Edgson, "Some Aspects of Shop Property'

Birth Control and Racial Progress, Society for Constructive, at Essex Hall, Strand, W C 8 30 p.m Debate on Constructive Birth Control, opened by Dr M I Finucane

Chemical Engineers, Institution of, at Burlington House, W Conference on "Vapour Absorption and Adsorption" 10 30 a m Prof Dr J C Philip, "The Reversibility of the Adsorption Process and the Thickness of the Adsorption Layer." Dr W. R Ormandy, "The Recovery of Acetone Vapours from the Air" 2 30 p m Messrs. H Hollings, S Pexton and R Chaplin, "The Recovery of Benzol from Coal Gas with special reference to the Use of 'Activated Carbon" Mr. Harry W Webb, "The Absorption of Nitrous Gases."

Chemical Society, Burlington House, W 8 p.m. (1) Messrs. U. R. Evans and J Stockdale, "Passivity of Metals. Part III—The Quantity and Distribution of the Superficial Oxide" (2) Mr. H Baines, "The Argentothiosulphuric Acids and their Derivatives Part I—The Preparation of the Sodium Salts and the Isolation of Monoargentomonothiosulphuric Acid" (3) Messrs. W. N. Haworth and C. R. Porter, "Sugar Carbonates. Part IV—The Dicarbonates of Glucose, Fructose, Mannose, Galactose and Arabinose" (4) Messrs. W N Haworth and C R. Porter, "Isolation of Crystalline α- and β-Ethylglucofuranosides (γ-Ethylglucosides) and other Crystalline Derivatives of Glucofuranose"

Electrical Association for Women, 46 Kensington Court, W. 7 p m Mr H Bourne, "Practical Hints about Bells, Batteries and Wireless Sets"

Electrical Engineers, Institution of, Savoy Place, W C 6 p m Dr H Norinder, "Surges and Over-Voltage Phenomena on Transmission Lines due to Lightning and Switching Disturbances"

Linnean Society, Burlington House, W 5 p m

L C C The Geffrye Museum, Kingsland Road, E 7 30 p m Mr Percy Lovell, "Sir Christopher Wren and his Influence on the Craftsmen of his Time"

Mechanical Engineers, Institution of, at the Royal Technical College, Glasgow 7 30 p m Mr John McNeil, "Nickel Non-Ferrous Alloys with special reference to Steam Engineering"

At the Engineers' Club, Manchester 7 15 p m Mr Thomas Hart, "The Conversion of an Electric Hoist'

Philological Society, at University College, Gower Street, W C 5 30 p m Prof Dr Sir Israel Gollancz, "Problems in the Alliterative Poems"

University of London, at Bedford College for Women, Regent's Park, N W. 4 30 p m Prof Eccles, 'Montaigne" (in French) (Lecture IX)

At Bedford College, Regent's Park, N W 5 15 p m Prof W Meyer-Lübke, "Les Origines Historiques des Langues Romanes" (Lecture III)

At King's College, Strand, W C 5 p m Dr W Robson, "Protein Metabolism" (Lecture IV)

At the Royal Society of Medicine, 1 Wimpole Street, W 5 p m Dr H P Mosher, "The Lower End of the Esophagus at Birth and in the Adult"

At University College, Gower Street, W C 3 p m Dr C Pellizzi, 'La Lirica del Paradiso" (Lecture V)

At University College, Gower Street, W C 5 15 p m. Prof J F G de Montmorency, "Momentous Lawsuits and Trials in various Countries from Classical to Modern Times" (Lecture IV)

At University College, Gower Street, W C 5 30 p m Prof E G Gardner, "Shelley and Italy"

Victoria and Albert Museum, South Kensington, S W 5 30 p m Mr L Gill, 'Lettering'

FRIDAY, DECEMBER 6 Chemical Engineers, Institution of at Burlington House, W Conference on "Vapour Absorption and Adsorption' 10 30 a m Mr A Hoch, "The Recovery of Volatile Solvents (Bregeat Process)" Mr. J Stanley Morgan, "The Continuous Adsorption of Gases by Adsorbents' 2.30 p m Mr G W Himus, 'Evaporation of Water in Open Pans" Messrs K Evans and H F Pearson, "The Industrial Application of Active Carbon"

Electrical Engineers, Institution of Savoy Place, W C 7 p m Dr C V Drysdale, "Alternating-Current Potentiometers and their Applications"

Geologists' Association, at University College, Gower Street, W.C 7.30 p m Lecture on 'The Great Barrier Reefs and the Queensland Coast A Geographical Reconnaissance"

Junior Institution of Engineers, 39 Victoria Street, S W 7 30 p m Mr A B Gowring, 'The Demolition of Lambeth Bridge."

Mechanical Engineers, Institution of, Storey's Gate, S W 7 p m Discussion on "Diesel Engine Developments," introduced by Mr W A Tookey

North East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-upon-Tyne. 6 p m Prof Dempster Smith, "Cutting Capabilities of Lathe Tools"

Royal Institution, 21 Albemarle Street, W 9 p m Mr Hugh Walpole, "The Novel and the Creative Spirit"

Rubber Technologists, Institute of, at the Manchester Café Ltd, Exchange Building, Manchester Mr H C. Young, "Works Control in the Rubber Industry"

University of London, at King's College, Strand, W C 5 30 p m, Prince D S Mirsky, "The Russian Drama Lecture VIII—The Modernist Theatre"

King's College, at 40 Torrington Square, W.C 5 30 p m Dr. O Odložilík, "Outlines of Czechoslovak History Lecture III—The Beginnings of Reformation in Bohemia."

At University College, Gower Street, W.C 5.30 p.m. Dr Jal Dastur C. Pavry, "The Religion of the Parsis." (Lecture I).

SATURDAY, DECEMBER 7. L.C.C The Horniman Museum, Forest Hill, S.E., 3.30 p.m. Mr. Montagu A. Phillips, "British Wild Life off the Beaten Track."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4020 *FRIDAY, DECEMBER 6th, 1929* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street Adelphi, W.C.2.

NOTICES

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NEXT WEEK

WEDNESDAY, DECEMBER 11th, at 8 p.m. (Ordinary Meeting). MAJOR CHARLES WHEELER, O.B.E., M.I.A.E., late Chief Automobile Engineer, General Post Office, "Overheads and other Factors influencing Road Transport Costs from an Engineer's View-Point." MR. JOHN MAUGHFLING, C.A., will preside.

FOURTH ORDINARY MEETING

WEDNESDAY, NOVEMBER 27th, 1929. DR. FRANK S. SINNATT, F.I.C., M.I.Min.E., in the Chair. A lecture under the Dr. Mann Trust on "The Examination of Coal and Coke by X-Rays," was delivered by MR. C. NORMAN KEMP, B.Sc., A.I.C., Secretary, Royal Scottish Society of Arts. The lecture will be published in the *Journal* on December 13th.

DR. MANN JUVENILE LECTURES

Under the Dr. Mann Trust, CAPTAIN C. W. R. KNIGHT, M.C., F.R.P.S., F.Z.S., will give two lectures for children on "The Golden Eagle," and "Wild Life in the Treetops," at 3 o'clock on Monday afternoon, December 30th, and at 3 o'clock on Wednesday afternoon, January 1st. The lectures will be illustrated by cinematograph films. The syllabus of the two lectures is as follows:—

LECTURE I (December 30th).—THE GOLDEN EAGLE. Romance of the Highland king of Birds—three eyries. The Adventures of William and his sister. The Crowning Climax. Slow motion film of Golden Eagle's flight. The liberation of Captain Knight's trained Eagle in Sutherlandshire.

LECTURE II (January 1st).—WILD LIFE IN THE TREETOPS. Close hand observations (pictures) of some of Britain's most dramatic birds in their tree-top homes—Herons, Hawks, Owls, Woodpeckers—as shewn in intimate studies. The pictures taken from an observation post on the swaying treetops are of exceptional beauty and thrilling interest.

Special tickets are required for these lectures. A sufficient number to fill the room will be issued to Fellows in the order in which applications are received, and the issue will then be discontinued. Subject to these conditions each Fellow is entitled to one ticket admitting two children and one adult. Fellows who desire tickets are requested to apply to the Secretary at once.

CANTOR LECTURES

MONDAY, DECEMBER 2nd, 1929. SIR RICHARD A. S. PAGET, Bt., in the Chair. DR. E. G. RICHARDSON, B.A., Ph.D., D.Sc., delivered the last of his course of three lectures entitled "Wind Instruments from Musical and Scientific Aspects." On the motion of the Chairman, a vote of thanks was accorded to the lecturer for his instructive and interesting course. The lectures will be published in the *Journal* during the Christmas recess.

PROCEEDINGS OF THE SOCIETY

THIRD ORDINARY MEETING

WEDNESDAY, NOVEMBER 20TH, 1929

MR. ROGER E. FRY, in the Chair

THE CHAIRMAN said he felt very much honoured in being allowed to preside at a lecture by Mr. Morley Horder on the preservation of rural and urban England, because, although he was not an architect, he had always had a great interest in architecture, and had sometimes rashly intervened in discussions of that subject, an indiscretion which he hoped to repeat that evening at a later stage. There was no doubt that rural and urban England was disappearing as fast as ever it could, certainly the rural and urban England which had been admired and liked; and the question was, What was going to replace it, or to what extent could it be preserved? It would not be preserved by the natural force of circumstances, only by a very definite desire on the part of those interested in it; and, of course, it was a very delicate question whether it was any use preserving a thing which would naturally go.

In approaching this question, it had to be considered what was really wanted. There were three types of people who had different desires, whom he would classify as the poets, the commercialists and the artists. Among the poets he would include the mass of the public, the cultured people, a good many journalists and the professional poets. These three classes of people all wanted slightly different things, The poets wanted the country to be kept entirely free of people; they wanted the people to be in towns, because the tradition of the English poets was that they got their inspiration from being alone in the country; and Wordsworth had objected very much to anything that would bring people to the Lake District. In a vague way, the general mass of the public had the poetic outlook. The commercial man had a definite outlook, which need not be discussed. The artist was in a peculiar position, because he was not as exigent as the poet. Whatever was done, he knew he would find his own business in it. Speaking as an artist, he thought perhaps the artist's one desire was that the journalist should not have his way. The artist objected to the country being altered in the direction of what the cultured journalist called "artistic development." The artist, he thought, had no desire to keep pylons away from the Downs, or railways away from the mountains; on the whole, he rather liked to see them there. That was where he differed from the poet. Those seemed to him to be the three classes who had to be considered in the matter; and he hoped Mr. Morley Horder would explain all that, and a great many more things.

The following paper was then read:—

URBAN AND RURAL AMENITIES

By P. Morley Horder, F.S.A.

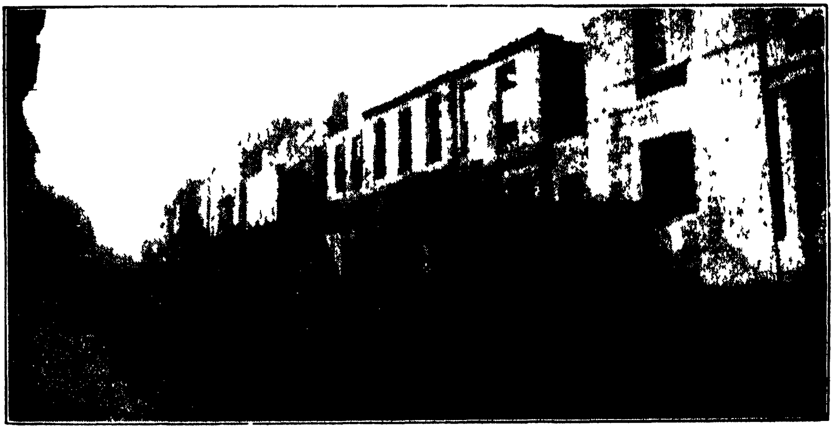
Some eight years ago, in a provocative address to the Royal Institute of British Architects, your Chairman to-night said "the vices of modern English architecture have always been inherent in the architecture of England." Modern conditions have brought out the rash! Modern conditions and modern science have put in the hands of modern architects the greatest opportunity in the history of the world. They have missed it completely, but to a great extent it was not their fault.

The unsettled condition of Europe and life generally since the War have only increased the rash, and there has been very little attempt to standardise the form of building into proportions suitable to the new conditions of living. We seem incapable of creating forms of building expressing new forms of construction, or preserving our traditional buildings with any courage for the value they obviously possess. The seemly and orderly late 18th century street architecture of Regent Street is now a series of architects' *motifs* with very little relationship to each other, and a noble street has been replaced at an enormous cost by an inferior one for the lack of a controlling idea. The complicated system of tenure and the necessities of revenue occasioned by the War account for the haphazard way London is being rebuilt, and it is difficult to suggest how any control can be exercised by the Architect, when it is possible to destroy the whole scale of a great thoroughfare like Park Lane without any certainty that the new scale established by the mammoth hotel will be respected both as to the height and materials of the new buildings which must certainly take the place of the old houses with which this generation is so familiar. The public are shocked at the sudden appearance of a building of these dimensions, and they hardly realise that they are fortunate (given the necessity) in the manner of the architecture of the new building in this street. This new block is so dominating in its scale there surely can be no excuse for not following its lines and materials in any new buildings which must inevitably rise along the whole length of the Park.

The London Parks are its greatest possession, and in Regent's Park we have a beautiful contrast of woodland emphasized by the ordered terraced houses, as characteristic of London as anything we possess. Huge blocks of flats are interrupting the once ordered serenity of the district. Regent's Park is Crown property and it may be necessary to rebuild and destroy the work of Nash and Decimus Burton. If so, here is an opportunity to control the grouping and materials of the new order of building with some standardised forms worthy of the surroundings. If the Londoner is forced by circumstances to live in flats, no finer situation could be found; but it needs foresight and vision if so beautiful a district is not to be at the mercy of the estate agent and the contracting mind. Portland Place was until recently one of the noblest of our London streets; it is now becoming typical of the hopelessness of our manner of dealing with architectural problems. For years its ordered fronts have been undergoing alteration, and now its continuity of design is to be frankly interrupted by new buildings, and its sky-line still more broken. The new British Broadcasting building which is being built here will no doubt be a very fine modern building, but it surely will be altogether out of scale with the street. I understand that the Royal Institute of British Architects are to build their

Newcastle House, Lewes. October, 1929.

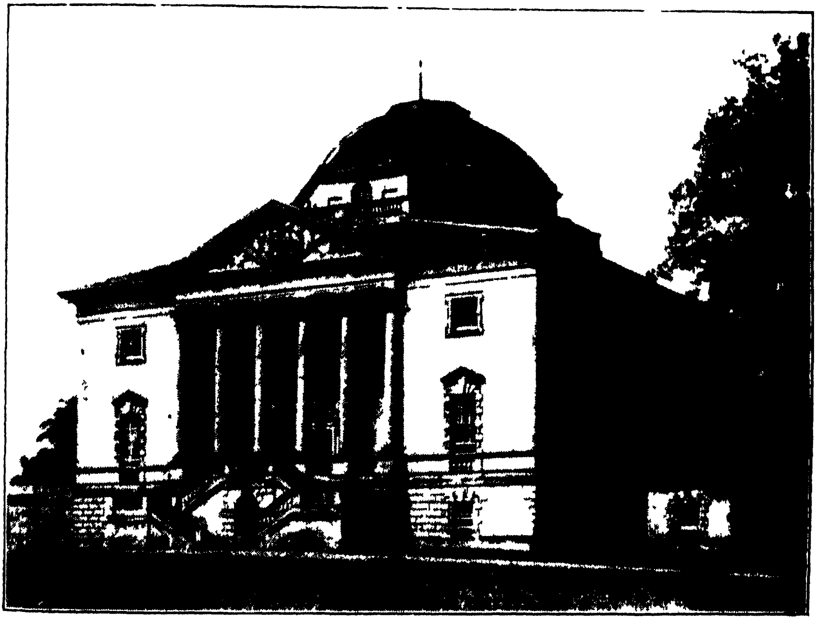
new home in this street. It is rather sad to think that they will further displace the street design of a great architect. The expression in architecture of the manner of another age must of necessity give place to the requirements of a new era, but one wishes it could be done in a less piecemeal way and with greater vision. The splendid scale of this street with its noble vistas to the Park was a great possession, and its reconstruction could obviously not be a success unless all the façades of the buildings therein were controlled by one mind. Apparently this is too late, and Portland Place will repeat all the errors of Regent Street, although it may contain many individually fine buildings. It is regrettable that the British Broadcasting Company and the Royal Institute of British Architects did not try to find a site, and associate themselves with the new Charing Cross Bridge, in connection with which surely sites of great architectural importance will be opened up. The Institute is at present housed in a building of considerable character. The new Bridge and the replanning in connection therewith should be the greatest opportunity for the engineer and the architect which has occurred for a generation. How suitable it would have been if the Architects could have housed themselves in a great modern building here associated with the modern development of wireless, instead of confusing the ordered architecture of another century. The cumulative effect of the street architecture of Adam will be lost to London, to the advantage, no doubt, of the owners of the ground rents. Thus is the art of architecture the sport of individuals. How far the growth of London will tempt the ground landlords as their leases fall in, to rebuild their streets and squares with any consistency, seems uncertain. If Lansdowne House is doomed, no doubt Berkeley Square will be rebuilt and become a shopping centre in the same way as Portman Square. The rebuilding of Portman Square was a real opportunity for a modern


Newcastle House, November, 1929

Adam or Nash to have been employed to design a noble square on modern lines with some real architectural articulation of the four sides. Such a scheme would have dealt successfully with the motor car, as part of the necessities of such a development, even if the gardens had to be sacrificed. The failure here to realise a complete architectural scheme should encourage the advisers to other estates in London to have some definite scheme of development for their squares and streets, and endeavour to arrange their leases to make it possible to rebuild on some definite architectural lines. Impressive squares and streets are impossible unless the units composing these are architecturally conceived by one mind. The best illustration, I suppose, of such conditions is the town of Bath, for which the architect, Wood, of Bath, was so largely responsible. The Royal Society of Arts building is a fitting place in which to speak of such a satisfying unity of ideas, as the streets of the Adelphi really illustrate all one has to say on the subject of the restfulness of proportionate detail interpreted in one material.

The standard of architectural knowledge and training is probably higher than it has ever been, and it is deplorable that there is so little evidence of this in the general rebuilding of our towns and villages. The very fact that one is astonished at individual beauty and simplicity in isolated buildings here and there, is an indication of how little the educated mind counts in the general rebuilding of our towns and villages. The excellence of the design of—say—a small bank or post office, or a village inn, only seems to emphasize the general vulgarity of the new buildings which spring up as isolated units on the great new roads, or in huddled masses on the coast, or as outcrops from our beautiful old towns. The daily press is full of protests on the subject of the disfigurement of England, and there are over fifty societies whose object it is to preserve the countryside or some relative part of its beauty. Innumerable books are published illustrating the beauty of England and its traditional building. The protests would appear to be sufficiently provocative, and the books eloquent. But they all reach a very small circle of interested and educated people. Is the man who lives in the hideous bungalow that offends us really always responsible for it. Many of these people either cannot get houses in the towns, or have a yearning to get away from their crowded or slummy surroundings at any price. The sense of possession of the smallest piece of land appeals to them, and they are intrigued by advertisements, and have often to put up with the merest shack of a house. Hardly any of these people are responsible for the character of their houses, many of which will be beyond repair before their last payment is made—if it ever is! The owners of great estates have no doubt been forced by circumstances to sell their land, but the haste that has been recommended by interested agents is the cause of the ill-considered development. Even if they desired to exercise control in the development, they have been told that any restriction would prevent a ready sale. This short-sighted policy has meant the depreciation of the land all round such unpleasant development. We are all familiar with the prospectuses of the development of a new estate, and the glowing terms in which its rural features are set forth, and all the safeguards for preserving its amenities. The accompanying plan generally exposes the fallacy of all such attempts. The surveyor-mind regards the area as so much space for the exercise of his ingenuity to get as many slices of land on to a given road, irrespective, usually, of the contours, natural boundaries, trees, aspect or views. The dreary roads are made, and sewered, and the controlling principle of the houses that eventually jostle each other with their conflicting designs and materials, is that they are supposed to have cost not less than so-much.

What is the remedy for all this ignorant destruction of this wonderful country and our interesting towns ? Have we any confidence that regulations and schemes of town planning are likely to improve the conditions ? There are more societies than ever before for protecting everything, from a Cathedral to a wildflower ! But the growth of unpleasant buildings and the general conditions of untidiness and destruction of natural beauty increase almost in proportion as the regulations for building become more onerous and exacting. We get very excited about projects for carrying, on suitable standards, the necessary electric current to assist the dying industry of agriculture, but the needless destruction of beauty which goes on day by day is soon forgotten. The public cannot be asked to buy all the estates, whose development may endanger the beauty of England ; why must there be so much fear of brick and mortar ? Mr. Flower, whose services to Stratford-on-Avon



Nuthall Temple, Nottingham

are so considerable, has made himself responsible for the preservation of the Welcombe Estate near Stratford. Why not develop it under wise direction? Try a sample house and see if with the right materials and with real consideration of the individual placing of each house, the fear of building is not groundless. The experiment of the larger view of Estate development is being tried by Lord Iveagh, near London. Surely it is a slight on modern architects if they cannot satisfy the educated layman that modern architecture can be as beautiful as in the days of Shakespeare. Let the houses be frankly modern and adapted to the requirements of to-day, with no attempts to use methods of building that have no meaning for this age. There is a well-known Estate near London still unspoiled, full of natural beauty. The owner has bought another property in a distant County. All appeals to his sense of inherited beauty have failed, and his Architects are instructed to parcel out the Estate to its utmost capacity of return. The immediate return in ground rents will, no doubt, be considerable, but surely it is possible that the secured amenity value might yield a more permanent return. The purchaser would gladly pay more for security of beauty. It is this selfish ownership of land that accounts for a great deal of the boring hideousness of modern development. The Advisers to the great Estates are not always disinterested, and future slums will be the consequence. The Architect himself does not touch these larger problems. He merely deals with individual buildings. Is it not time he was

Nuthall Temple.

called in to direct personally the undertakings of our impoverished landlords, not at so much a building, but for a fee commensurate with his vision? The ominous word " Pylons " associated with this necessary communication of electrical supply, looms large in our imagination. The design for these so-called " Pylons " has been approved by an architectural authority—why could not one of these be put up for inspection? It is quite likely that they would hardly be noticed in relation to the sweeping landscape of the downs—they certainly will be harmless compared with the ugly and congested " Bungaloid " groups which are springing up everywhere. We have got accustomed to the necessary telegraph poles which line and almost seem to give direction to many of our roads sweeping over open country; their tidy usefulness does not offend. I even know an aerial station and aeroplane hangar which seem quite beautiful compared to the houses which surround them. All of this goes to prove that what is essentially necessary and is carried out with an economy of means is never offensive.

The Royal Society of Arts is essentially an institution for educating the public mind in the Arts and Sciences, and there is no society with so complete an equipment to influence taste in every direction and to emphasise the importance of preserving all that matters in our traditional building and to point the lesson which these buildings illustrate. I can best illuminate these desultory remarks about town and country buildings by some typical examples of the work the Society has been doing.

Mr. Morley Horder then showed a series of slides of West Wycombe Village, which the Royal Society of Arts is actively engaged in re-modelling; the unique cottage at Smarden, Kent, which through the vigilance of the Society is now in safe hands, without the Society having been put to any expense: and the interesting group of cottages known as the Thomas à Becket Cottages at West Tarring, Sussex.

A photograph was shown of Newcastle House, Lewes, which has been the subject of public controversy for some time, and it was generally thought had been saved. Mr. Morley Horder stated that he had a telephone message from Mr. Godfrey, the well known architect and antiquarian, who lives in Lewes, informing him that it was in the course of demolition, and Mr. Godfrey sent some slides showing this. The Royal Institute of British Architects were appealed to to save this building, but they intimated that they were not concerned with buildings of beauty which were picturesque rather than architectural. Considerable interest was taken in these slides, and it was resolved to send a telegram to the Town Clerk of Lewes, deploring its destruction. The Lecturer pointed out that this building could hardly be described as characteristically picturesque, and it would be surprising if anything could be put in its place which would be as satisfying in its relation to the other irregular lines of the street. Apart from any question of architecture, was it not sheer waste to pull down such a building, which obviously could be adapted to the reasonable requirements of the Local Authority of a small country town? The local protest in connection with this proposed destruction seemed so general and authoritative that one despaired of any effort to save interesting buildings if the ratepayers in a town like Lewes had no more interest or authority than to allow such an outrage. It would be interesting to see the type of building which took the place of the pleasant but unassuming house.

Photographs of Nuthall Temple were then shown. Mr. Morley Horder said that this was one of the finest examples of Palladian architecture we possessed in England and pointed out that if the architectural profession regarded Newcastle House as merely picturesque and therefore outside the province of an architectural society, what could be said of the destruction of so noble a building ? Apart from the architectural values of the buildings, the view from the colonnade was one of the most characteristic English vistas. Surely this was a possession of the greatest value to Nottingham, especially as it was within a short tram ride from the centre of the town. It is believed that the building was sold for about £4,000 to a builder, and was by now probably entirely demolished. Up till the actual day of the sale, everything possible was done to arouse public attention, both in Nottingham and London, in the matter. Then, when it was too late, the local paper said : " The destruction of Nuthall Temple is perhaps the worst piece of vandalism for which—someday—our present generation will be held responsible." A well-known and rich citizen of Nottingham said he had never seen the place and had never met anybody who had ! Such are the depths to which an appreciation of fine architecture has fallen.

William Shenstone's House, The Leasowes, Halesowen

The Lecturer also mentioned that the Royal Society of Arts had been appealed to by the Secretary of the Shenstone Society to help in the preservation of Shenstone's interesting house and surroundings, and that he had taken the opportunity, when near Birmingham, to go and look at the house and gardens, the description of which he was familiar with. Very little remained of the garden as described, but the seemly and orderly house of the period (now used as a golf club) remained much as it was in Shenstone's time, and the surroundings, which were threatened by the speculative builder, were still attractive. In his introduction to "Men and Manners," Mr. Havelock Ellis said: "Shenstone is ranked among the minor figures in literature, even in eighteenth century English literature. Yet he has always been a significant figure for those who are able to see what signifies, and to-day his significance, not only for England but for Europe generally, continues to increase." In the "Cambridge History of English Literature," where we might reasonably expect to find the standard literary opinion of our time, it was noteworthy that both Mr. Saintsbury, who dealt with the minor poets of the eighteenth century, and Canon Hutton, who dealt with the minor prose writers, alike independently referred to the undue neglect of Shenstone; "a tendency at all times to treat him too lightly," said the former, who added, also taking his prose into consideration, that we may put Shenstone after Collins and Gray for "The root of the matter": while the latter stated that Shenstone's prose had too long been neglected by lovers of good writing. As regards Shenstone's wider significance in the development of ideas in the modern world, that has been minutely studied of recent years by various writers in Germany and Switzerland and America."

He would like to remind the architectural profession in Birmingham that although Shenstone ranked as a poet in a rather superficial age, it was really suggested that he should be remembered for better reasons. Disraeli said :– "When we consider that Shenstone, in developing his fine pastoral ideas in the Leasowes, educated the nation into that taste for landscape gardening which has become the model of all Europe, this itself constitutes a claim on the gratitude of posterity. Thus the private pleasures of a man of genius may become at length those of a whole people." Shenstone died in 1763. The Society of Arts was founded in 1754 as an encouragement to the Arts, and it would be very suitable if the Society could arouse Birmingham to a sense of their responsibility in connection with this interesting literary association in their neighbourhood. "Your town of Birmingham grows very polite," wrote Lady Luxborough to Shenstone, "I think the Players who enjoyed the pleasure of your grove should have entertained you there. How delightful would be the Masque of Comus acted on this spot."

DISCUSSION

THE CHAIRMAN said everyone must have been appalled by the destruction of such objects as the Nuthall Temple, a building which might easily have been adapted to all sorts of modern uses. At the same time, it was difficult to know what could be done. The best chance seemed to be that each county should undertake the work for itself. On the other hand, important as it was to preserve architecture, it was infinitely more important to educate the public in the desire for new and for beautiful architecture. He thought the last few years had shown a growing interest in the mass of the ordinarily educated public in architecture. If the hopes for the future of architecture in Europe were to come to anything in England, a number of old habits and old abuses would have to be swept away, a number of privileged positions would have to be destroyed, and the innate conservatism of the English in preventing those necessary changes would have to be overcome. Coming back from Italy, where architecture was endemic, he had wondered what was at the bottom of the difficulty of good building in England, and one thing seemed to be the inferiority complex of the English. The English were afraid of any big or generous gesture in public. Even the vile things erected in modern Italy had at least got self-confidence and generosity; whereas the idea in England seemed to be that a building must necessarily be very bad, and so the least possible should be done. He would rather see wild, desperate, costly experiments made with public buildings than the niggardly, hopeless attitude with which the English muddled through their national monuments and public buildings.

SIR RICHARD PAGET, Bt., Hon.A.R.I.B.A., agreed with the Chairman that it was even more important to produce good examples of architecture in the present than to preserve good examples of former work. He did not think that the lack of enterprise of the English was entirely due to an inferiority complex; it was also due to the national laziness. It was impossible to have new architecture, using new materials and solving new problems, without a lot of original thought; and most people were extremely disinclined for original thought. Scissors and paste were much easier to handle than brick and stone, and therefore it was left to the engineers, like his friend Dr. Faber, to deal with the structure, which was then covered in whatever style was wanted. That, of course, was fundamentally bad and wrong, and the present generation would be blamed and despised in the future for its want of courage in dealing with its present problems. Each generation ought to leave behind it examples showing the continuity of its architectural development. It was terrible to pull down a building like the Nuthall Temple; but it was equally terrible to build a street like Regent Street when there was a really great opening for really great building. Regent Street was one continuous shop from start to finish, with tube stations at each end. It might have been the most convenient centre in the world; but instead of being treated as one, it had been treated as a number of separate shops, so that one could not get from any of the tubes or buses into the shops without going into the rain. That was a disaster which a little forethought might have prevented. It should be demanded of architects and designers that they should provide buildings which really satisfied modern needs. We must solve our own problems in a rational, serious, scientific, engineering, sympathetic and artistic manner.

DR. MARY BOOTH expressed the opinion, as one who had been out of England for fifteen years, that the matter under discussion was a British Commonwealth matter. In the Dominions children were brought up with great love and reverence for the beauty of England, and it was a tremendous disappointment to come back and find that many old beautiful buildings had vanished, with only a small tablet on an adjacent wall to say what had been there, and sometimes not even that. Seeing that there was a large number of societies all intent on preserving beautiful buildings, she wondered why something more could not be done. It might be advisable for them to employ a publicity agent.

A MEMBER OF THE AUDIENCE remarked that probably a good deal of the trouble about the preservation of beautiful buildings was due to the ratepayers not voting for the right people on their local councils.

SIR HENRY MIERS, F.R.S., said he had been shown an excellent scheme in one of the Scandinavian countries, where a large piece of land was reserved where examples of various periods of architecture were preserved.

In England there were a great many things which the English people did not seem to think it was worth while to make beautiful, such as office buildings, and even gas-holders. Even gas-holders could be made presentable.

DR. OSCAR FABER called attention to the outstanding case of Durham Castle, which had been found to be failing some two years ago, and for the preservation of which only one-fifth of the requisite money had been subscribed. Durham Castle was probably a unique specimen of Norman domestic architecture. He imagined that in relation to Durham Cathedral it formed a group of buildings on the brow of a hill which was unique in the whole world. There was a serious risk of Durham Castle slipping bodily off the brow of the hill and being discovered one morning in the river unless the restoration were completed.

He thought it was possible to go too far in the attempt to preserve the old. In the case of exceptional examples, a very substantial effort should be made to preserve them ; but if the nation was to continue as a really virile nation, it must continually replace the old with new. It must scrap dead things and go for the live thing. One could not make new aeroplanes out of old carts. He was satisfied that if the present generation did not build as well as earlier generations, it was due not to any lack of technique. It was much more a spiritual question than a question of technique.

A Member of the Audience asked whether the pylons on the Downs were to be taken as possessing æsthetic beauty. Speaking as a Philistine, he had learnt from the Chairman to understand and to accept things in an artistic sense which were prima facie repellent to him.

The Chairman said the reply to the last question depended upon whether one took the poet's or the artist's standpoint. The poets wanted to look at things entirely from their associated ideas. The associations of any recent piece of engineering work were vulgar ; the associations of old pieces might be quite different. The windmill was a piece of engineering, and it had become, in course of time, an object of beautiful and poetic associations. Similarly, railways were ceasing to have the vulgar feeling associated with them ; they were becoming almost romantic. When he spoke of the beauty of useful and necessary engineering works, he was speaking from an artistic point of view, in which associated ideas were of no consequence, and in which a succession of pylons running along the Downs might add to his sense of the beauty of movement of the surface of the Downs. From his point of view, what had destroyed rural England was the planting of the hedges in the fifteenth century, which destroyed all sense of the sculpture of the earth. A railway running round the curve of a hillside might give more significance to that curve. There would always be two fundamental points of view on that subject.

Mr. G. K. Menzies said he wished to pay a public tribute to the lecturer for the great amount of time, energy and professional skill which he had devoted to the Society's work in connection with the preservation of the villages of West Wycombe, Arlington Row, Bibury, and other places. Nobody but himself (Mr. Menzies), knew how great a debt was owed to Mr. Morley Horder for that work. He pointed out the urgent need of the Society for further funds in order to carry out that work satisfactorily and with expedition.

Mr. E. Hockliffe said the Chairman was well acquainted with the work done by the National Art Collections Fund, and asked whether it would not be possible to make an appeal to form a similar fund for the preservation for the nation of works done in the past by Englishmen.

Sir Richard Paget pointed out that the Council for the Preservation of Rural England co-ordinated the work of all other similar societies.

The Chairman said there was already a National Arts Collection Fund, which only required further financial support to do more work. The advantage of a society which collected pictures was that it could show them in some central place like London. Probably if it had been possible to save the Foundling Hospital, and turn it into a public building, accessible to everyone for some public purpose, that would have been an object-lesson of the kind that the National Art Collections Fund had really been successful in bringing about.

THE LECTURER, in reply to the discussion, said he had nothing further to add except that he was very much obliged to the audience for listening to his desultory remarks about rural England, and to Mr. Roger Fry for his kindness in taking the Chair.

On the motion of the Chairman, a vote of thanks to the lecturer was passed unanimously, and the meeting then terminated.

NOTES ON BOOKS

A CATALOGUE OF PAINTINGS IN THE COLLECTION OF JULES S. BACHE. Privately printed.

This book of reproductions is sumptuous but sober, and worthy of a fine collection. Of the three Giovanni Bellinis in Mr. Bache's possession one might most covet the Madonna and Child, which has the suave strength of the master's best work. Unaffected and graceful, it is designed with science and executed with loving artistry; one could not weary of it. Though hardly to the point, it is interesting to note that the picture was once in the collection of William Beckford.

The Crivelli Madonna and Child is as characteristic as nearly all Crivelli, with its watered silk and symbolic fruits, frieze carved in stone and odd naturalistic bluebottle. Who can wonder that the " exile of Ascoli," as some journalist before his time might have described Crivelli, only managed to build up about three pictures per annum? The Madonna's lips are rather small, her fingers rather attenuated, but the attractions of the picture communicate themselves to her.

The lady by Domenico Veneziano, perhaps Elisabeth of Montefeltro, has a coiffure of the kind, common in her day, with which Baldovinetti's lady has most familiarised visitors to the National Gallery. Speaking of Montefeltro: it is to be observed that the Giuliano de' Medici to whose portrait by Raphael we come later on was one of that exquisite and immortal group assembled at Urbino in 1507, at the court of the great Federigo da Montefeltro's son and successor. Giuliano was the friend as well as model of Castiglione, and he appears in Sir Thomas Hoby's translation of " The Courtier " as My Lord Magnifico.

Mr. Bache's Filippino Lippi has that tender, wistful charm which the son of Filippo and pupil of Botticelli expressed so delicately in a manner all his own. Of sterner stuff are the three Titians in this remarkable collection. The Venetian Nobleman's cloak, chain and sword-belt lend themselves to a strong design. The Venus and Adonis is similar in composition to our own and several others; here the cherub is not asleep under a tree, but a spectator of the passionate scene.

These are only a selection from the impressive list of Italian pictures, which comes to an end with a Cosimo Tura, and is followed by a choice series of Flemish pictures.

Bouts could paint with grace, but not with the grace of Van der Weyden; he is most personal when he paints with verve and " lets himself go "; so we linger with less attention over his Madonna than over the Carthusian of Petrus Christus or David's Nativity. The sturdiness of David, his grave, unsensational design and patient craftwork, are guessed here more easily than from his Madonna, which follows. Memling's Madonna has the *finesse* that we know we can be sure of finding, but here as elsewhere the draughtsman has a little thwarted the painter, and we get a somewhat flat, unsubstantial Child in the more solid Madonna's arms. The Van der Weyden Man with Turban is interesting, but does not reveal the master's power.

Van Dyke, painted by himself, is shown as a *beau garcon*, worthy of his august patrons. The roving eyes and sensual lips are not here robbed of any of their magnetism by moustache and beard, as in the Louvre portrait. The Earl of Warwick may well have been pleased with the ultra-dramatic representation of himself made by this most talented of virtuosi.

Mr. Bache's Dutch pictures include three Rembrandts, two of which he was good enough to lend to the Burlington House exhibition this year. In Curiosity, Terborch has indulged his fancy for white satin, and arranged his little comedy in a better judged volume of pictorial space than he sometimes gives us. Two Vermeers bring another chapter to a close.

The little boy by Goya is fascinating—with his birds and cats, one of which is suffering dreadfully from its repressed desire to spring. How did Goya manage to give his droll humour so much rein without dragging his pictures down to a plane of commonplace? Largely no doubt by fusing his tones in a manner more true to colour harmony than to life.

Two portraits by Velasquez, one of himself, the other of the Infanta Maria Theresa, seem to have the assurance with which the great man usually carries conviction of his grasp of personality as well as of every aspect, aesthetic, ceremonial, or psychological, of the problem in hand.

Of the ten French pictures we are most likely to be arrested by the Watteau, The French Comedians, once in the collection of Frederick the Great. It has a hardness of design too seldom found in glamorous productions of the baroque century—so intellectual in its other manifestations. The English portraits are fine and characteristic.

The English Heritage Series. Edited by Viscount Lee of Fareham and J. C. Squire. London: Longmans, Green and Co. 3s. 6*d*. each.
Shakespeare. By John Bailey.
English Wild Life. By Eric Parker.
English Humour. By J. B. Priestley.
The English Public School. By Bernard Darwin.

These four little books are the first of a series dealing with the past of this country. They are attractively produced by Messrs. Longmans, and they should both supply and help to create a demand for retrospective essays: we are well supplied, nowadays, with threats, promises and prophecies relating to the future.

In his general introduction, Mr. Stanley Baldwin succeeds in doing what is commonly called "striking the right note"—that middle C of picturesque, rural conservatism which is like an echo from a time before our modern discontents arose. The future will indeed be depressing if it does not restore to us some of the joys of the past, withheld from a number of uneasy generations. The design will be new, but let the content of the new world be congenial to the most human side of humanity; let us be more easy-going again, and get our food fresh and our pleasures at first hand.

One can never envy the writer who undertakes a book on Shakespeare. The very freedom which such a subject permits is, in one aspect, a serious limitation. Writing about Shakespeare, one is apt to reveal *oneself*, not the great man, whose universal sympathies (I am not speaking of his genius) were of a kind that remains rare to-day. Even Mr. Bailey does not succeed in refraining from, so to speak, *claiming* Shakespeare for a particular group. He practically assures us that Shakespeare had a rigid belief in the sanctity of marriage laws. And here is a curiously difficult sentence, expressing a view of another side of the poet's personality. " It seems impossible to doubt that Shakespeare was not at all what is now called democratic in his political or social sympathies. There is nothing surprising in that: very few people were in those days." Does Mr. Bailey mean " very few people," or " very few people *who mattered* " ? Of course Shakespeare disliked mobs : but does the anti-democrat court them less than the democrat ? And does the democrat *like* them, or does he want to raise them from their condition because he has a sense of justice ? The devil can quote Shakespeare as well as Scripture, so we are well advised to keep open minds about the poet's character, and not make sure that he would have felt more at home in one or another section of the modern community, had he been born again.

In Mr. Parker's " English Wild Life " not only English, but also Welsh and Scottish countryside and waters are described with tenderness, and a fear we may feel at the outset is quickly dispelled by sentences like this : " To me, at all events . . . . the pheasant is not first and foremost a bird of the table. He is a bird of April . . . ." Before this we have read : " I shall never lift a rifle again at a stag . . . ." After all, the English have led the modern world in humanitarianism, and there is nothing un-English in showing more love of animals than of sport. Mr. Parker's manner is reflective rather than boisterous, and this quietness makes his book, which is full of perfectly relevant information, agreeable reading for those who do not entirely share his interests as well as for those who will be warmed by the recital of their familiar joys.

When Mr. Priestley speaks of the humour of Shakespeare and Dickens he is doing his duty as a recorder ; these two great men are ever " best sellers," and need no recommendation. But Peacock, Marryatt and Surtees are not read half as much as they should be : Mr. Priestley might have insisted more strongly on their remarkable qualities. Peacock he admires, without apparently quite understanding him, or recognising the force of his irony. Is there no seriousness in the words of Mr. Escot, the Deteriorationist, when he says, speaking of material progress : " Profound researches, scientific inventions : to what end ? To contract the sum of human wants ? To teach the art of living on little ? . . . . No ; to multiply factitious desires . . . . to invent unnatural wants . . . ." However, Peacock was too civilised to wish to force on his readers conclusions they could not draw for themselves from his arguments, and so he is usually accounted no more than a witty and amiable stylist. It is good to be reminded by Mr. Priestley that Marryatt was not simply a writer of books for boys : Professor Saintsbury has tried to make the same fact known to our seniors, and the " Oxford Book of English Prose " properly contains a marvellous passage out of " Peter Simple," an English classic which combines style with humour, and is *par excellence* the book of our navy.

Mr. Bernard Darwin writes delightfully well : reasonably, without passion. His subject is not really a promising one, and he does not adopt the attitude that " the battle of Waterloo was won, etc," or indeed that all the triumphs of England and the Empire were won by our semi-Spartan, semi-Athenian public schoolboys. He does not altogether admire the grown-up schoolboy of fifty or sixty, who, in fact, when not tiresome, is pathetic. It seems curious that so many public school-masters should be drawn straight from the universities, having had no experience, or practically none, of the wide world outside the academic circle.

One of Mr. Darwin's chapters deals with famous Heads. The picture of Almond of Loretto is most interesting. Almond was superb : but did he not miss his true vocation ? I can offer no suggestion as to what this might have been. Only one may be allowed to feel that it is better for the young to attend schools where they can " scramble themselves " (Jane Austen's words) into a little education, than schools where their imagination is dominated by one man's personality. A little learning is less dangerous than much enthusiasm. It is all too easy to impress children : far harder to encourage them to think independently. But this is what schools should do.

MEETINGS OF THE SOCIETY

ORDINARY MEETINGS.

DECEMBER 11.—MAJOR CHARLES WHEELER, O.B.E. (Mil.), M.I.A.E., formerly Chief Automobile Engineer of the General Post Office, " Overheads and other Factors influencing Road Transport Costs from an Engineer's Viewpoint." JOHN MAUGHFLING, C.A., will preside.

JANUARY 8.—SHAW DESMOND, " The Novel—What it is and what it is not."

JANUARY 15.—JOSEPH BURTON, A.R.C.Sc.I., of Pilkington's Tile and Pottery Company, Ltd., " Quality in Pottery." PROFESSOR. H. E. ARMSTRONG, Ph.D., LL.D., D.Sc., F.R.S., will preside.

JANUARY 22.—GILBERT STONE, Barrister-at-Law, Legal Consultant to the Advisory Council on Minerals of the Imperial Institute, " Observations on the Mining Laws of the British Empire." SIR RICHARD A. S. REDMAYNE, K.C.B , M.Sc., M.Inst.C.E., will preside.

JANUARY 29.—SIR THOMAS HOLLAND, K.C.S.I., K.C.I.E., D.Sc., F.R.S., Principal and Vice-Chancellor of Edinburgh University, " The International Bearing of Mineral Products." (Trueman Wood Lecture).

FEBRUARY 5.—SIR WILLIAM CLARE LEES, O.B.E. (British Economic Mission to South America), " Some Aspects of the Question of Trade with South America." SIR EDWARD T. F. CROWE, C.M.G., Comptroller-General, Department of Overseas Trade, will preside.

FEBRUARY 12.—HOLBROOK JACKSON, Editorial Director of " The Drapers' Organiser," " Colour Determination in the Fashion Trades." THE RIGHT HON. LORD EBURY, D.S.O., M.C., will preside.

FEBRUARY 19.—G. K. CHESTERTON. (Subject to be announced later.)

FEBRUARY 26.—PROFESSOR F. A. E. CREW, M.D., Director, Animal Breeding Research Department, University of Edinburgh, " Genetical Methods of Live Stock Development."

MARCH 5.—PROFESSOR ARTHUR R. LING, M Sc., F.I.C., School of Malting and Brewing, University of Birmingham, " Brewing as a Branch of Science." SIR WILLIAM WATERS BUTLER, Bt., F.C.S., Past-President of the Institute of Brewing, will preside.

MARCH 12—PROFESSOR G. ELLIOT SMITH, M.D., F.R.S., " The Human Brain."

MARCH 19.—HESKETH HUBBARD, R.O.I., R.B.A., " The Making of Prints."

Dates to be hereafter announced :—

CHARLES E. DOUGLAS, M.I.Mech.E., M.I.Struct.E., " RICE Cultivation and Treatment."

S. K. RATCLIFFE, "National Parks."

GRANVILLE BARKER, "A National Theatre."

W. KING WILSON, Rabbit Specialist, Harper Adams Agricultural College "The Economic Importance of Rabbit Produce."

INDIAN SECTION.

Friday afternoons at 4.30 o'clock.

JANUARY 10.—SIR BASIL P. BLACKETT, K.C.B., K.C.S.I., "The Economic Progress of India."

FEBRUARY 7.—

MARCH 7.—G. H. TIPPER, M.A., F.G.S., M.I.M.M., late of the Geological Survey of India, "Recent Mineral Developments in India" (illustrated by lantern slides).

APRIL 4.—LIEUT.-COLONEL SIR WOLSELEY HAIG, K.C.I.E., C.S.I., C.M.G., C.B.E., Lecturer in Persian, School of Oriental Studies, University of London, "The Maratha Nation" (Sir George Birdwood Memorial Lecture).

MAY 9.—DAVID CLOUSTON, C.I.E., M.A., D.Sc., "The Report of the Royal Commission on Indian Agriculture."

DOMINIONS AND COLONIES SECTION.

Tuesday afternoons at 4.30 o'clock.

JANUARY 28.—SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., "Settlers' Problems in Kenya."

FEBRUARY 25.—

MARCH 25.—O. J. R. HOWARTH, O.B.E., M.A., Secretary, British Association for the Advancement of Science, "The Work of the British Association in relation to the Empire."

APRIL 29.—

CANTOR LECTURES.

Monday evenings, at 8 o'clock.

HAROLD WRIGHT (of Messrs. P. & D. Colnaghi & Co.), "Three Master Etchers: Rembrandt, Meryon, Whistler." Three Lectures. January 20, 27 and February 3.

> LECTURE I.—THE ETCHINGS OF REMBRANDT VAN RIJN, 1606-1669. Rembrandt's predecessors in etching. His earliest etchings. Etchings of beggars. The illustrations of Biblical subjects. The Landscapes. The portrait etchings. Influence of Rembrandt's work on subsequent etchers. Tributes to Rembrandt's genius as an etcher.
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> LECTURE II.—THE ETCHINGS OF CHARLES MERYON, 1821-1868. Meryon's parentage. His youthful voyage to the South Seas. Return to Europe. Initiation into painting and etching. Etchings after Zeeman. The Paris etchings. The Bourges and South Seas plates. The Portraits and other commissioned plates. Meryon as a Social Reformer and Poet. His death. Some tributes to his genius.
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> LECTURE III.—THE ETCHINGS OF JAMES MCNEILL WHISTLER, 1834-1903. His student days. Etchings of Alsace and Paris. He comes to London. The Thames series. The Portraits and Landscapes in drypoint. The Transition Period. The First Venetian series. The second Venetian series. The Cameos. The Etchings of Touraine, Paris, Brussels and the Netherlands. Whistler's influence on the revival of etching. Some tributes to his genius.

ALFRED B. SEARLE, "Recent Improvements in Methods of Brickmaking." Three Lectures. February 17, 24 and March 3.

LECTURE I —Bricks still the most pleasing of artificial building materials, some reasons for this Hand-moulded bricks the most beautiful, but too costly and too difficult to produce for many modern requirements Enormous quantities now needed yearly necessitate mechanical methods of production from many kinds of materials

Modern methods for making bricks of plastic or potentially plastic clays—Plain Bricks—Rustic Bricks

LECTURE II —Methods for making bricks of clays, shales, and other slightly plastic materials The Stiff-plastic Process—the Semi-dry Process—the Tunnel Kiln and its effect on Brickworks Design Multi-coloured Bricks

LECTURE III —Methods of making bricks of non-plastic materials Sand-lime Bricks Slag Bricks Clinker Bricks Bricks from Colliery Tips Cement or Concrete Bricks Silica Firebricks Magnesite Bricks Zirconia Bricks Sillimanite and allied Bricks Conclusion

COMMANDER F G COOPER, R D, R N R "Aids to Navigation" Three Lectures March 24, 31 and April 7

DR MANN JUVENILE LECTURES

CAPTAIN C W R KNIGHT, M C, F R P S, F Z S Two Lectures Monday, December 30 at 3 o'clock, and Wednesday, January 1, at 3 o'clock Illustrated by Cinematograph Films

LECTURE I —"The Golden Eagle

LECTURE II —"Wild Life in the Treetops

Special tickets are required for these lectures

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY DECEMBER 9 Brewing Institute of at the Charing Cross Station Hotel Strand W C 7 45 p m Mr J A Pickard The Metafilter in the Brewery

East India Association Caxton Hall Westminster S W [illegible] p m Mrs Underhill Women and New Movements in India

Electrical Engineers Institution of Savoy Place W C 7 p m Discussion on To Earth or not to Earth opened by Messrs W R Rawlings and E C Gilbert

At the University Liverpool 7 p m Lt Col S L Monkhouse and Mr L C Grant The Heating of Buildings Electrically by means of Thermal Storage

At Armstrong College Newcastle on Tyne 7 p m Messrs B A G Churcher and A J King The Analysis and Measurement of the Noise emitted by Machinery

Farmers Club at the Whitehall Rooms Hotel Metropole S W 5 p m Annual Meeting Prof R G White Recent Developments in the Breeding and Management of Sheep in Great Britain

Heating and Ventilating Engineers at the Borough Polytechnic Southwark S E 7 p m Mr B A Pountney Common and Uncommon Boiler Troubles

Metals Institute of at 39 Elmbank Crescent Glasgow 7 30 p m Mr G I Cassidy Melting Furnaces

Surveyors Institution 12 Great George Street S W 8 p m Mr W E A Bull The Landlord and Tenant Act 1927 in Operation

Transport Institute of at the Institution of Electrical Engineers Savoy Place W C 5 30 p m Prof R G H Clements Road Engineering in its Relation to Road Transport

Swiney Lecture on Geology at the Royal College of Science (Old Building) South Kensington S W 5 30 p m Dr Douglas Allan Rocks as Records of Earth History Lecture I Sedimentation and Fossils"

University of London at Kings College Strand W C 5 30 p m Maj Gen Sir F Maurice The Western Front 1915 from the Battle of Festubert to the Battle of Loos Lecture I The Situation in the Spring of 1915

At the London School of Economics Houghton Street W C 5 p m Mr E H Warmington The Debt of Medieval Explorers to Ancient Discoverers (Lecture IV)

At University College Gower Street W C [illegible] p m Principal J B McEwen England in Shakespeare's Day Lecture IX Elizabethan Music

At University College Gower Street W C 5 30 p m Miss E J Davis How London became the Capital of England (Lecture IV)

TUESDAY DECEMBER 10 Anthropological Institute 52 Upper Bedford Place W C 8 30 p m Messrs T A Joyce and J E Greening The Expedition of the British Museum to British Honduras 19

Automobile Engineers Institution of at the Kings Head Hotel Coventry 3 p m Dr A P Haigh, The Relative Safety of Mild and High Tensile Steels under Alternating and Pulsating Stresses

Electrical Engineers Institution of at the Hotel Metropole Leeds 7 p m Lt Col S L Monkhouse and Mr L C Grant The Heating of Buildings Electrically by means of Thermal Storage

At the Engineers Club Manchester 7 p m Dr G C Simpson Lightning (Kelvin Lecture)

Illuminating Engineering Society at the Home Office Industrial Museum Horseferry Road S W 7 p m, Discussion on Problems in Illuminating Engineering"

Marine Engineers Institute of 85 88 The Minories E C 6 30 p m Engineer Vice Admiral Sir Robert B Dixon Presidential Address

Mechanical Engineers Institution of, at the Royal Metal Exchange Swansea 6 30 p m Mr R A Wetheral Some Features of Municipal Accounts and Finance and their Bearing on Cost Accounts

Metals Institute of, at Armstrong College, Newcastle-on-Tyne 7 30 p m Mr W T Griffiths Nickel in Non-Ferrous Foundry Alloys"

Petroleum Technologists, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Mr. John Gillespie, "The Engineer in relation to the Petroleum Industry."

Philosophical Studies, British Institute of, at the Royal Society of Arts, Adelphi, W.C. 8.15 p.m. Mr. G. Lowes Dickinson, "The Value of Art."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. Sir B. Pares, "Russian History to 1861. Lecture IV—Serfdom."

At the London School of Economics, Houghton Street, Aldwych, W.C. 5 p.m. Prof. B. Ohlin, "The Relation between International Trade and International Capital and Labour Movements." (Lecture I).

Wednesday, December 11..Anthropological Institute, at the Portland Hall, Great Portland Street, W. 5.30 p.m. Prof. F. G. Parsons, "The Anthropological History of the Modern Englishman."

Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Mr. A. H. Barker, "The Heating of Buildings by Electricity off Supply Mains with special reference to the Problem of Heat-Storage and Off-Peak Loads."

Fuel, Institute of, at Burlington House, W. 6 p.m. Mr. W. D. Wylde, "The Coal Burning Art as applied to Steam Production."

Public Health, Royal Institute of, 37 Russell Square, W.C. 4 p.m. Prof. Dr. Winifred Cullis, "Speed as a Psycho-Physiological Factor in the Life of To-day."

Swiney Lecture on Geology at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture II—Vulcanicity and Metamorphism."

United Service Institution, Whitehall, S.W. 3 p.m. Sir Edward Denison Ross, "The Situation in the Middle East."

University of London, at the London School of Economics Houghton Street, Aldwych, W.C. 5 p.m. Prof. B. Ohlin, "The Relation between International Trade and International Capital and Labour Movements" (Lecture II).

At the London School of Economics, Houghton Street, W.C. 6 p.m. Lecture X on "Office Machinery."

At the School of Oriental Studies, Finsbury Circus E.C. 5.15 p.m. Mr. W. Sutton Page, "The Greatest Bengali Poet of the XIXth Century—Madhu Sudan Datta."

At University College, Gower Street, W.C. 3 p.m. Dr. C. Pellizzi, "La Lirica del Paradiso." (Lecture VI)

At University College, Gower Street, W.C. 5.30 p.m. Mr. D. Cockerell, "Bookbinding as a Hobby and as a Career."

At University College, Gower Street, W.C. 5.30 p.m. Mr. A. M. Wijk, "The Reformation Period in Sweden." (Lecture III).

Thursday, December 12..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Dr. W. Rosenhain, "The Development of Materials for Aircraft Purposes."

Asiatic Society, 74 Grosvenor Street, W. 4.30 p.m. Prof. Dr. S. Langdon, "Results of the Excavations at Kish, Season 1928-9, by the Herbert Weld and Field Museum Expedition."

Chemical Industry, Society of (Chemical Engineering Group), at the National Smelting Co., Ltd., Bristol. Mr. Stanley Robson, "The Treatment of Flotation Concentrates preparatory to Zinc Smelting."

Chemical Society, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 5.30 p.m. Prof. Dr. H. Freundlich, "Surface Forces and Chemical Equilibria." (Liversidge Lecture).

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Messrs. L. A. E. Sekutowicz and A. Evain, "The Electrical Plant and Network of the Société Electrique de la Sidérurgie Lorraine." (Joint Meeting with the British Section of the Société des Ingénieurs Civils de France).

Electrical Engineers, Institution of, at University College, Dundee. 7.30 p.m. Mr. A. F. Stevenson, "Cable Design."

Historical Society, 22 Russell Square, W.C. 5 p.m. Prof. G. S. Veitch, "William Huskinson and the Controverted Elections at Liskeard in 1802 and 1804."

L.C.C. The Geffrye Museum, Kingsland Road, E. 7.30 p.m. Mr. C. A. Hindley, "Veneering Past and Present."

Metals, Institute of, at 83 Pall Mall, S.W. 7.30 p.m. Messrs. D. F. Campbell and W. S. Gifford, "Metal Melting by Electricity." (Joint Meeting with Institute of British Foundrymen).

At the Chamber of Commerce, Birmingham. 7 p.m. Mr. A. H. Mundey, "Die-Casting."

North East Coast Institution of Engineers and Shipbuilders, at the Cleveland Institution, Middlesbrough. 7.30 p.m. Mr. N. J. Lunam, "Modern Constructional Steel Work."

Oil and Colour Chemists' Association, at 30 Russell Square, W.C. 7.30 p.m. Mr. G. King, "Silicon Esters."

University of London, at Bedford College for Women, Regent's Park, N.W. 4.30 p.m. Prof. Eccles, "Montaigne" (in French). Lecture X.

At the London School of Economics, Houghton Street, Aldwych, W.C. 5 p.m. Prof. B. Ohlin, "The Relation between International Trade and International Capital and Labour Movements." (Lecture III).

At University College, Gower Street, W.C. 5.15 p.m. Prof. J. E. G. de Montmorency, "Momentous Lawsuits and Trials in various Countries from Classical to Modern Times." (Lecture V).

At University College, Gower Street, W.C. 5.30 p.m. Dr. C. Pellizzi, "Cesare De Titta, poeta abruzzesse."

Victoria and Albert Museum, South Kensington, S.W. 5.30 p.m. Miss Muriel Clayton, "Medieval Brasses."

Friday, December 13..Astronomical Society, Burlington House, W. 5 p.m.

Engineering Inspection, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Captain B. H. Peter, "The Trend of Development in Railway Signalling."

Eugenics Society, at Burlington House, W. 8 p.m. Dr. C. C. Weeks, "General Morbidity."

Junior Institution of Engineers, at the Royal Society of Arts, Adelphi, W.C. 7.30 p.m. Inaugural Meeting. Sir Ernest W. Moir, Presidential Address, "Tunnelling by Compressed Air."

Malacological Society, at University College, Gower Street, W.C. 6 p.m.

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Prof. G. F. Charnock, "Bearings for Line Shafting."

Metals, Institute of, at the University, St. George's Square, Sheffield. 7.30 p.m. Prof. Dr. F. C. Lea, "Physical Testing."

North East Coast Institution of Engineers and Shipbuilders, at Bolbec Hall, Newcastle-upon-Tyne. 7.15 p.m. Informal Meeting, "Is Sea Experience Essential in order to become a Good Marine Engineer?" introduced by Mr. Edmund Wilson.

Oil and Colour Chemists' Association, at Milton Hall, Deansgate, Manchester. 7 p.m. (1) Dr. Stern "Fastness to Light." (2) Mr. C. D. O. Winslade, "Some Aspects of Colour Testing."

Royal Institution, 21 Albemarle Street, W. 9 p.m. Miss D. A. E. Garrod, "Cave Excavation in the Near East."

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture III—Tectonics and Earth Structures."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. H. B. Charlton, "The Comic Idea in Shakespeare."

At King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "The Russian Drama. Lecture IX—Post-Revolutionary Drama and Cinema."

King's College, at 40 Torrington Square, W.C. 5.30 p.m. Dr. O. Odlozilik, "Outlines of Czechoslovak History—I. Lecture IV—The Hussite Movement."

At University College, Gower Street, W.C. 5.30 p.m. Dr. Jal Dastur C. Pavry, "The Religion of the Parsis." (Lecture II).

Saturday, December 14..L.C.C., The Horniman Museum, Forest Hill, S.E. 3.30 p.m. Miss M. A. Murray, "Witchcraft."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4021 *FRIDAY, DECEMBER 13th*, 1929 VOL LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NOTICES

DR. MANN JUVENILE LECTURES

Under the Dr. Mann Trust, CAPTAIN C. W. R. KNIGHT, M.C., F.R.P.S., F.Z.S., will give two lectures for children on "The Golden Eagle," and "Wild Life in the Treetops," at 3 o'clock on Monday afternoon, December 30th, and at 3 o'clock on Wednesday afternoon, January 1st. The lectures will be illustrated by cinematograph films. The syllabus of the two lectures is as follows:—

LECTURE I (December 30th).—THE GOLDEN EAGLE. Romance of the Highland king of Birds—three eyries. The Adventures of William and his sister. The Crowning Climax. Slow motion film of Golden Eagle's flight. The liberation of Captain Knight's trained Eagle in Sutherlandshire.

LECTURE II (January 1st).—WILD LIFE IN THE TREETOPS. Close hand observations (pictures) of some of Britain's most dramatic birds in their tree-top homes—Herons, Hawks, Owls, Woodpeckers—as shewn in intimate studies. The pictures taken from an observation post on the swaying treetops are of exceptional beauty and thrilling interest.

Special tickets are required for these lectures. A sufficient number to fill the room will be issued to Fellows in the order in which applications are received, and the issue will then be discontinued. Subject to these conditions each Fellow is entitled to one ticket admitting two children and one adult. Fellows who desire tickets are requested to apply to the Secretary at once.

FIFTH ORDINARY MEETING

WEDNESDAY, DECEMBER 4th, 1929. SIR LAWRENCE WEAVER, K.B.E., in the Chair. A paper entitled "The Advertiser and the Disfigurement of Town and Countryside: Criticisms and Suggestions," was read by MR. H. HARRY PEACH, Hon. Secretary of the Exhibition Committee, Council for the Preservation of Rural England.

The paper and discussion will be published in the *Journal* dated December 20th.

PROCEEDINGS OF THE SOCIETY

FOURTH ORDINARY MEETING

DR. MANN LECTURE

WEDNESDAY, NOVEMBER 27, 1929

DR. S. SINNATT, M.B.E., F.I.C., M.I.Min.E., in the Chair

THE CHAIRMAN said that the subject upon which the lecturer was going to speak was the X-ray examination of coal and coke. Mr. Norman Kemp was a pioneer in this particular branch. He had been faced in the past with very great difficulties for two reasons, first, the difficulty of the technique of X-rays as applied to coal, and secondly, the absence of knowledge with regard to the structure of coal itself. The Society would also give him a special welcome as the Secretary of the Royal Scottish Society of Arts.

The following lecture was then delivered :—

THE EXAMINATION OF COAL AND COKE BY X-RAYS

By C. NORMAN KEMP, B.Sc., F.R.S.E., Secretary, Royal Scottish Society of Arts

The present occasion is invested with more than ordinary interest for me on account of my official connection with the Royal Scottish Society of Arts, which, though considerably younger than the Royal Society of Arts, has consistently endeavoured since 1821 to promote similar objects. These were, perhaps, better expressed by the original title—The Society for the Encouragement of the Useful Arts in Scotland.

I esteem it a high honour and privilege to be afforded this opportunity of presenting to the senior Society a brief survey of the work which I have carried out in a very small corner of the vast field of Fuel Technology.

In 1921 and 1925 Cantor Lecture courses dealing with X-rays were delivered by Dr. G. W. C. Kaye and Dr. V. E. Pullin respectively, and towards the end of the latter year Dr. R. Lessing presented a Cantor Lecture course on the subject of Coal Ash and Clean Coal.

I am therefore in the extremely fortunate position of finding that my small corner of the field has already been tilled by three distinguished Scientists with each of whom I have had the pleasure of discussing various aspects of the subject which forms the theme of the present lecture. My rôle, therefore, seems now to be that of harvester, and I hope to be able to show that results of a certain scientific interest, and possessing possibilities of practical application, await the reaper who has sown the seeds of research on the combination—X-Rays and Clean Coal.

It would be superfluous for me to dwell at any length either on the production and properties of X-rays or on the ordinary and well-known characteristics of coal, but I may be permitted to remind my audience of certain considerations which have an immediate bearing on the subject from the new point of view which obviously results from a direct mode of examination involving the inner structure of an opaque substance.

The outstanding and medically familiar attribute of X-rays which renders them of such extraordinary value in diagnosis, is their ability to penetrate all matter. This penetration is accompanied by partial or total absorption, and emergent radiation may be made to exhibit characteristics related to variations in the matter through which the beam has passed. The investigation of the emergent radiation may be carried out in two principal ways. It may be received on a fluorescent screen when the degree of fluorescence provides a visible differentiation of the field of view which constitutes a shadow picture of the structure of the specimen. If a photographic plate be substituted for the screen, an exposure results in changes in the emulsion similar to those produced therein by ordinary light, and on development, a negative is obtained which exhibits density gradations corresponding and proportional to the luminosity variations where a fluorescent screen is employed.

Prior to the War, Radiology may be said to have been a specialised subject within the sphere of medical practice. During and since the War, the applications of X-Rays in non-medical directions have steadily increased in number and importance. To such an extent is this the case that it is now not merely possible, but altogether desirable to subdivide the whole Science into two branches—Medical Radiology, and Technical Radiology—without any suggestion of equality either as regards scope or importance.

Dr. Kaye has already addressed you on " X-Rays and their Industrial Applications," and a perusal of his book on this subject, published in 1922, provides ample proof of the already vigorous growth of the younger branch of radiologica science.

I wish now to reproduce a short quotation from the Second Cantor Lecture on The " History of Radiological Research " by Dr. Pullin.

> " Let us now consider the present position and try to understand exactly what modern research on apparatus is aiming at. I intend to exclude all reference to that highly important aspect of the subject—its medical applications.
>
> 1. We will first decide what we want X-Rays to do.
> 2. Then we will see what apparatus we have at present and whether it will do it.
> 3. Then we must determine what apparatus we want and whether we shall be able to get it.
>
> What do we want X-Rays to do ? We want radiology to be the *indispensable adjunct* to all engineering practice. That will do for the moment.
>
> X-Rays enable us to examine the interior of materials without in any way damaging or destroying them. That is a fundamental fact of the greatest importance."

Dr. Pullin is largely concerned with the penetration of material built up of heavy atoms, and he was able to announce in 1925 the successful penetration of four inches of steel,—only 30 years after the discovery of the rays themselves.

On commencing the examination of coal by means of Röntgen Rays a few years ago, I was naturally faced with considerations precisely similar to those quoted above.

A decision as to what the rays were required to do had been reached by earlier investigators, to whose work I shall refer later. With regard to existing apparatus, it was easy enough to improvise an equipment consisting of a source of electric current, an induction coil, and some sort of X-Ray bulb, and with it to carry out radioscopic (fluorescent screen) examinations, or to produce radiographic records of specimens.

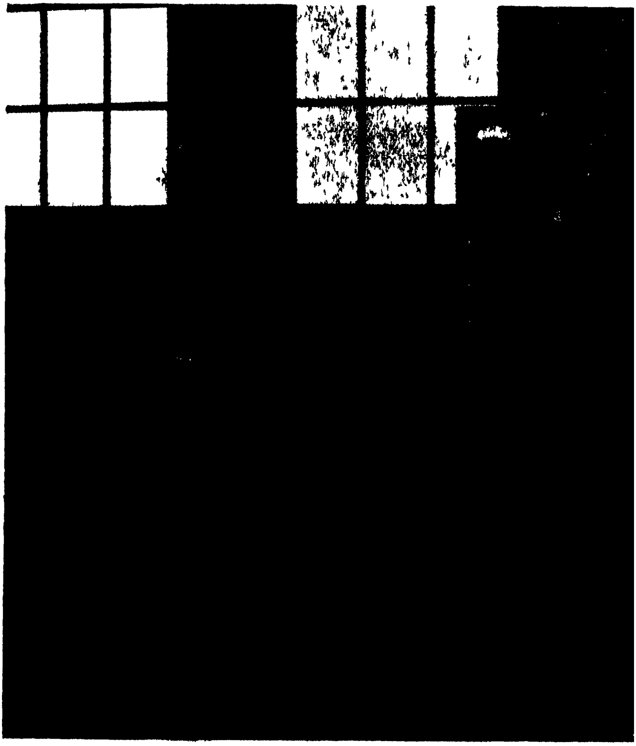

FIG. 1.—"Carboscope" X-ray Unit.

It was obvious, however, that real progress would demand the availability of less delicate, simpler, and safer apparatus, and I was then confronted with the consideration contained in Dr. Pullin's third heading—the apparatus desired and its availability.

It will be evident that Manufacturers of X-Ray equipment are guided as to design by the requirements of their Clients, and as the Medical Profession provide by far the largest Market, the apparatus which can readily be bought conforms to standards largely or even wholly different from those of the technical worker. For him the prime requirements are simplicity and safety, coupled with robust construction. In a word, an industrial X-ray unit should be as nearly as possible "foolproof." Without wishing to labour the point, I should perhaps add that none of the desirable characteristics mentioned are rarely lacking in medical X-ray equipment, but it must be borne in mind that such is destined to be used in therapeutic and diagnostic work on living people, and must therefore be provided with intricate accessories and adjustments which are wholly unnecessary where mere inanimate objects are to be dealt with.

I was fortunate in being enabled to co-operate with Messrs. Watson & Sons (Electro-Medical) Ltd., London, in the production of an X-Ray unit of a type suitable for coal research. This has been fully described elsewhere, but an example is shown in the accompanying photograph. The essentials High Tension Transformer and X-Ray Tube – are contained in a lead-lined box from which the beam of rays emerges through a celluloid window upon which specimens may be placed for visual or photographic examination.

Normally, the "Carboscope" as we have called it, is connected to alternating current mains, and when this is possible, the equipment is devoid of moving parts and assumes its simplest possible form. When the electrical supply is continuous, a rotary converter becomes necessary, as shown in the photograph. The switchboard is naturally slightly less complicated in the case of the Alternating Current outfit.

Such equipment would be useless for the examination of plates of steel, and apparatus capable of the latter service would be quite unnecessarily large, elaborate, and costly for the examination of coal and similar substances.

HISTORICAL.

Having thus indicated the nature of the radiographic equipment of to-day, and that formerly employed, it may be of interest to present a brief review of the work of the first entrants into the field of coal examination by means of X-Rays.

Until recently I was under the impression that the earliest work of this nature had been carried out in France, but a reference to the subject by Dr. Potonié in his "Einführung in die allgemeine Kohlenpetrographie" led me to search out a short article in the "Zeitschrift für das Berg : Hütten · und Salinenwesen," where it is stated that the results of an X-Ray examination of more or less uniform sections of coal, and of sized products obtained from a coal-washing plant, had appeared in the periodical Der Kompass in November, 1897.

It is of no small interest to learn that the Mines Hospital at Sulzbach possessed thus early a Röntgen Ray installation, and it is equally remarkable to find it being so promptly applied to the investigation of washery products.

The research in question, under the title "Untersuchung des Aschengehaltes von Steinkohlen mittelst Röntgenstrahlen" revealed the now familiar appearance presented by the " mineral skeleton " of coal, a term introduced by Couriot in his notable paper published in the following year.

Some of the results obtained at the Sulzbach Mine from dissections based on radiographic evidence, and followed by incineration of the various fractions obtained, are tabulated :—

	Darker parts	Lighter parts
Seam No. 2	16.3%	3.4%
„ „ 4	5.2	2.2
„ „ 4	8.9	1.7
„ „ 6	9.1	1.6
„ „ 1	6.5	1.5

It appeared from these figures that the ash-producing matter in coal is often very unevenly distributed, and that some standardisation of method would be necessary in order to render possible comparisons between given pieces of coal and others of known ash-content.

The investigators at once perceived that suitable material was ready to hand in the " fines jig " of the Sulzbach coal-washer, and accordingly samples were taken differing widely in ash content, viz : 4.2%, 14.4%, 18%, and 36% respectively.

These were dried, slightly powdered, and poured between glass plates held 1.5 cm. apart in a frame. The different samples were separated from each other by small wooden blocks. The radiographs are reproduced, and show obvious differences in tone, but these are insufficiently marked to render possible a determination of ash content with the requisite accuracy, which, according to the writer of the article, should, in practice, be within one tenth of one per cent. The further observation is recorded that additional uncertainty results from the widely differing chemical character of ash producing materials, with correspondingly differing permeability to X-Rays.

With our increased knowledge of the conditions of radiographic work it is scarcely surprising that the pioneers of 1897 failed to establish a new analytical method ; indeed it may at once be admitted that the problem attacked in Germany, France, and Belgium in 1897, 1898, and 1899 respectively has not yet been solved, though hopeful lines of advance now exist and are under investigation.

In 1898 the Berliner Neueste Nachrichten published a communication in which Caryl D. Haskins of Philadelphia, claimed to have discovered that the calorific value of coal may at once be ascertained by examination with X-Rays. The claim is criticised as being far from simple, requiring more time than an incineration, and then yielding results of inferior accuracy. It is added that practical results are scarcely to be anticipated from an attempt to estimate the ash content of coal by X-Rays, but that, on the other hand, an important forward step may be made in purely scientific questions as to the distribution of the ash content in coal.

I have dealt with the foregoing historical investigations in some detail, as I am not aware of their having previously been brought to light in our Country.

Reviews of subsequent papers by Couriot, Daniel, and Garrett & Burton are contained in my paper on the X-Ray Analysis of Coal, published in 1924, and I will confine my references to them to the exhibition of a few lantern slides

A very extensive study of Japanese coals has been in progress since 1920 by Iwasaki, and this worker uses X-Rays as an accessory method in his detailed microscopic examinations, as the detection of regions of special significance from his point of view is much facilitated thereby.

In an early paper Iwasaki remarks:

> "The study of coal in Europe and America has already been made in detail to some extent, but the microscopic structure of Japanese coal, which is different from that of foreign coal, has so far been left uninvestigated. We have some studies conducted by Makino and others by means of X-Rays, and some results of its investigation under the reflection-microscope by Kadokura.
>
> The former chiefly aimed at knowing the amount of ash, and the latter at the origin of the coal, but neither gives us important aids for our fundamental study. This compelled the writer to take up the investigation for himself.
>
> Our present study is not to determine the species of plants of which coal was made, nor to trace its origin, but it particularly aims at discovering the internal structure of the coal and of making the steps of its development—from the original plants to the actual coal—clear. This investigation will naturally lead to the explanation of its origin. Besides the discoveries on the scientific side, we hope for other results from the investigation. Most of the gas-manufacturers, coke-makers, coal-analyzers, and other chemists of to-day treat coal as a mass. They think it is only a black block, but we shall prove that it is complicated in its structure and composition. The investigation of it, we believe, will yield great aid to chemical technology."
>
> * * * * * *
>
> "Although some coal is so dark that any kind of light can not be transmitted through the thin sections, the transparent minerals, such as quartz and calcite, which are most frequently present in our coal, become visible of course under the microscope. In spite of all the above mentioned extensions, opaque minerals such as pyrite, cannot be observed by the transmitted light. And, moreover, although minerals may be quite transparent, if they are much smaller than the thickness of the thin sections, they are imbedded in the section and become invisible by the transmitted light, even when they can be seen on the surface of the coal. Thus it is necessary to have the light reflected from the polished surface of the coal.
>
> In addition to the above mentioned, the X-ray is also applied in order to determine the nature and the arrangement of the mineral matters contained in coal. The thickness of the plates made for this purpose is between 1.24 mm. and 2.12 mm. Photographs of them taken under the X-rays show very interesting figures. Sometimes the plates on which the pictures have been taken are examined under the microscope, and the forms of the mineral grains printed on the plates are observed, and, if needed, photographed on a magnified scale."

We may now proceed to consider the "black block" from the radiographic stand-point, and to inquire as to the nature of the information which is afforded by X-ray examination.

Coal ordinarily is examined from the two aspects indicated in the description of the important work in progress under the direction of Dr. Sinnatt—The Physical and Chemical Survey of the National Coal Resources.

Physical methods involve, *inter alia*, an examination of banded structure; the manner in which specimens tend to fracture; the characteristics of the different categories which result from a mechanical dissection of layers, and of mineral particles and the like, which are found in association with them. Individual pieces of coal may be reduced to such a thickness as to permit of their examination under the microscope by transmitted light; and methods of surface etching are also employed.

The only remark relevant in the present connection as to chemical methods of investigation, is that these involve the more or less complete destruction of the *physical* identity of the coal.

Although the point may lack practical importance, it is to be noted that radiographic examination involves no change whatever in the specimens subjected thereto. It may, therefore, reasonably be claimed that it should precede other methods of examination, as observations which result from radioscopic or radiographic inspection cannot but make some contribution to subsequent tests, each of which has its appropriate place and purpose.

A radiographic negative of a homogeneous material of uniform thickness exhibits a field of uniform photographic density. Such a result is rarely obtained in the case of coal, and it is this fact which lends to the method the value which it possesses.

Every variation in composition results in a corresponding variation in absorption, and consequently leads to radiographic differentiation. This is more or less distinct within the coal substance proper, but becomes highly diagnostic of included or associated mineral matter. In this way it is possible to distinguish in a specimen between regions which contain no visible discrete particles, and those where such particles are more or less abundant. Such particles, generally speaking, consist of, or contain, inorganic matter, and regions where they are absent, though not necessarily or even probably devoid of inorganic content, are described as pure coal substance, i.e., coal containing only " intrinsic " ash.

It may here be noted that the use of the word " ash " presents difficulties of description. As ordinarily employed the term refers to the product obtained after burning, or, from the laboratory standpoint, after incineration. In the present discussion " ash " has no place whatever, and yet it is difficult if not impossible to avoid reference to it, in view of the double meaning which it has now acquired.

According to the literature, coal containing only intrinsic, inherent, constitutional, or fixed " ash " signifies coal having its inorganic content so bound up within it that separation cannot be effected by any mechanical means. A further term has recently been proposed, viz., " minimum ash."

Extrinsic, extraneous, or free " ash " on the other hand refers to inorganic matter which can be distinguished in the form of discrete particles or in innumerable other forms, and which can be separated by mechanical means from the coal with which it may be associated.

Radiographically, therefore, it may suffice to divide coal into two categories, - the coal proper, and the mineral skeleton,– as these are the two divisions primarily revealed by X-rays, and here the ash of the chemist obviously has no immediate place, though *potentially* present.

This point is emphasised by Dr. Kellett in his paper on the " Distribution of Ash in Bituminous Coal Seams," in which he introduces two new terms :—" It has been found necessary," he writes, " in the present investigation to distinguish between the ' ash ' existing in the coal prior to ignition and that remaining after incineration The term *potential ash* is used to indicate the mineral matter in the coal before incineration, while the material remaining after complete incineration is designated *residual ash*."

It will be apparent from the lantern illustrations that a certain amount of information of a qualitative nature may be obtained from an examination of the radiograph of a particular piece of coal. This remains true even where both the thickness of the specimen and the conditions of the radiographic exposure exhibit considerable variations. It is clear, however, that a systematic investigation should be preceded by a standardisation of conditions not only as regards the specimens, but also in respect of the radiographic variables.

A method of preparing large coal sections having smooth, flat, and parallel surfaces was accordingly elaborated at H.M. Fuel Research Station, and I was then enabled to pursue the examination of a considerable quantity of new material and to institute comparisons amongst the resulting radiographs The method of preparing the sections is described in detail, and a number of radiographic reproductions are given in my paper on " The X-Ray Examination of Coal Sections."

The next step in the main investigation related to the radiation, and involved an endeavour to define the conditions under which comparable radiographs may be obtained, as it might at first sight seem a simple matter to produce two identical radiographs of an inanimate object such as a block of coal. This work formed the subject of a paper entitled " The X-Ray Analysis of Coal : The Radiographic Variables and their Control," in which I enumerate twelve factors each of which plays its part in the process under discussion. These are as follows :—

I Relating to the Specimen.
  (*a*) Thickness.
  (*b*) Orientation.
  (*c*) Distance from radiating source.

II. Relating to the Radiation.
  (*a*) Penetrating power or " quality."
  (*b*) Intensity or " quantity."
  (*c*) Duration of incidence.

FIG. 2.*—Radiograph of Coal Section (Full Size)

*Reproduced by kind permission of the Royal Society of Edinburgh

III. Relating to the X-Ray Film.
- (*a*) Type of film.
- (*b*) Composition of developer.
- (*c*) Temperature of developer
- (*d*) Time of development.

IV. Relating to the Final Reproduction.
- (*a*) Method of printing from negative.
- (*b*) Method of Reproduction from Positive.

The conditions under headings I and III are readily standardised, and those arising under heading IV need not be considered. We are thus concerned mainly with the emission from the X-Ray tube. It is comparatively easy to arrange for the substitution of one film by another without displacement of the specimen ; to ensure that the two films used possess identical photographic characteristics ; and to carry out development in such a way that no differences will result purely therefrom. It should then merely be necessary to adjust the apparatus so that an appropriate current flows through the tube, and to make successive exposures of identical duration.

If this be done with a " Gas " tube installation, it will prove practically impossible to secure two identical negatives, and while the use of a hot-cathode X-ray tube vastly increases ease of control, it does not wholly eliminate the difficulty, and even then it is essential to " run " the tube for a period sufficiently long to ensure stability and constancy of output before the desired exposures are made.

It is thus necessary to go even further than Castelli who remarks, evidently from experience, in a paper published in 1925, that " two radiographs cannot be compared with each other excepting when they have been made by the same operator, with the same apparatus, and by means of exposures of identical duration."

The foregoing details are given in order to show that while the production of a coal radiograph is a perfectly definite operation, it is not by any means so easy to obtain consistent and comparable results as earlier investigators evidently imagined. In many cases the refinements indicated may be dispensed with, but in at least one important operation (stereoradiography), they are essential.

Let us now briefly consider the appearance presented by a coal section which has been prepared and radiographed in the manner described. It will first be observed that an elaborate banded structure is present in this particular case, and that the number of bands or layers is probably greater than that apparent from a visual examination. Each radiographically distinguishable layer represents a change in composition, and the possible significance of these changes both from the physical and the chemical points of view is of sufficient importance to be made the subject of further inquiry.

I may quote briefly from a recent paper by Dr. Sinnatt, entitled, " Some Fundamentals of the Carbonisation of Caking Coals : The Formation of Cenospheres," with reference to a particular coal section which was prepared at H.M.

FIG. 2.*—Radiograph of Coal Section (Full Size)

Reproduced by kind permission of the Royal Society of Edinburgh.

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I may quote briefly from a recent paper by Dr. Sinnatt, entitled, "Some Fundamentals of the Carbonisation of Caking Coals: The Formation of Cenospheres," with reference to a particular coal section which was prepared at H.M.

Fuel Research Station, and later subjected to mechanical dissection there in accordance with my radiographic evidence :—

> " The coal, which was 8 inches of the thickness of the seam, was cut into a slab ½ inch thick, and the layers seen in the (X-Ray) photograph are the inorganic constituents present in the separate narrow bands parallel to the bedding planes. When the photograph had been obtained the actual piece of coal was carefully dissected, and the chief layers, of which 21 could be recognised, were separated and the percentage of ash present determined, together with the amount of iron. The results show the great variation in the amount of ash present, and the fundamental differences in composition as can be judged by the percentage of iron. Lessing and Cobb and their associates have proved conclusively that the inorganic constituents have a profound influence upon the yield of products obtained during carbonisation, and also upon the structure and properties of the coke obtained. In view of this each individual layer in the above typical piece of bituminous coal may yield coke possessing definite characteristics, and quite distinct from its neighbour."

These radiographs also show very clearly the way in which the coal is traversed by numerous thin veins of mineral matter having a general direction perpendicular to the bedding planes of the coal.

Among other appearances, examples of tiny " faults " are to be observed in these structures, and not least in interest are the regions which have been *more* easily penetrated by the X-Rays than the *purest* coal present, and which, therefore, probably represent minute fissures in the coal from which the inorganic content has been removed in solution. These appear in the radiographic positive as fine lines which are white, or at least of a tone lighter than that of the purest coal present.

A discussion as to the probable origin of these and other structures as observed in some of my radiographs occurs in a paper by Prof. Henry Briggs, " A Note on the Mineralogy of Coal as suggested by X-Ray Examination."

Limitations of space forbid more than a passing reference to preliminary experiments designed to lead to the measurement of the photographic densities of standardised radiographs in terms of a recognised density scale. This becomes a question of photometry, and the work is not yet sufficiently far advanced to warrant further mention.

I have also in view the working out of a practical means of effecting a qualitative determination of the commoner minerals occurring in larger masses in coal, by the use of X-Rays of appropriate " hardness." In this way it should be possible both to detect and to distinguish, for example, between plates of quartz, calcite or pyrites even when completely invisible at the surface of the specimen.

In conclusion of the more academic part of the subject, I would refer to an interesting method of X-Ray examination which has been applied by my colleague, Mr. Leslie Thomson, and myself to the examination of coal and coke, which both, from their heterogeneous nature, provide outstandingly suitable material for the purpose. I refer to the stereoscopic technique whereby two radiographs of a specimen are made on separate films which are then viewed in an instrument which enables the observer to examine the coal or coke as if it were a transparent or translucent mass.

In the case of coal the combustible portion yields a more or less undifferentiated solid field, within which, according to size, shape, density, and distribution, may be seen the mineral matter present.

Apart from its scientific interest, this procedure has its value in the fact that a radiograph of a section may exhibit a region where the total radiographic density at the point under consideration is not that due to the coal plus a particular mineral mass contained within it, but is due to the coal plus two such masses so disposed that they have been radiographically superimposed. In such an instance, as in many others, a single negative would lead to misinterpretation, whilst a stereoscopic pair would at once space out the two inorganic masses involved, and exhibit them in their actual relative positions in space.

Stereoradiographs of coal and coke provide curious and interesting objects for examination, and a more extended study of this comparatively little known branch of the main subject has been carried out under my direction by Mr. Arthur N. Wilson, whose paper on "The X-Ray Stereoscopic Examination of Coal," is in the Press, and will provide details of the actual technique.

Turning now to practical considerations it will be recalled that the first recorded application of X-Rays to coal examination related to products from a coal-washing plant.

The preparation of coal for the market, which embraces "washing" by numerous familiar methods, or "cleaning" when the process employed is a dry one, formed a considerable part of the subject-matter of Dr. Lessing's second Cantor Lecture on Coal Ash and Clean Coal. This question is one of such outstanding importance that it is worth while to enquire if X-Rays can usefully be employed in connection therewith.

In 1925 Mr. William McLaren published a paper on the Scientific Control of Coal-Washing by the Combined Application of Ash-Characteristic Curves and X-Ray Examination, in which he showed, *inter alia*, the advantage offered by the latter method in facilitating the establishment of the end points of washability curves. An investigation on these lines has not yet been fully followed up, and should provide a fruitful field for further study.

This is referred to in the newly-issued Report of the Fuel Research Board for the year ended March, 1929, in which it is stated that "The application of the (X-Ray) method to coal-washing, for example, should prove of value. An X-Ray examination of the coal to be cleaned may reveal the amount of "inherent" or "constitutional" ash (derived from the original plant *débris*) which, because of its fine state of division, cannot be removed by washing and will therefore decide the minimum ash content obtainable in the clean coal. From a study of the so-called "extraneous" ash it may be possible to determine the size to which the particular coal should be crushed to ensure the most effective cleaning."

Referring once again to Dr Lessing's second Cantor Lecture, we find under the heading, " The Control of Coal Washing and Cleaning Processes " the following

> " The various processes used or proposed for the improvement of the quality of coal depend on physical laws the theory of which in many cases still remains somewhat obscure The amount of truly scientific research done on these questions is very small compared with the values involved A first requirement for improvements in the preparation of coal in general, and washing and cleaning processes in particular, is a more extensive and more efficient control of existing plants Many of these are run without chemical control in others such control is of a casual and spasmodic character The principal method of controlling the work of a coal washery is to submit the products to float-and-sink tests and to estimate the ash percentages in the fractions thus obtained Attempts have been made from time to time to apply mathematical treatment to the results obtained, but generalisations as to the degree of washability of coals usually fail on account of insufficient knowledge of the kind, relative proportions and distribution of the impurities "

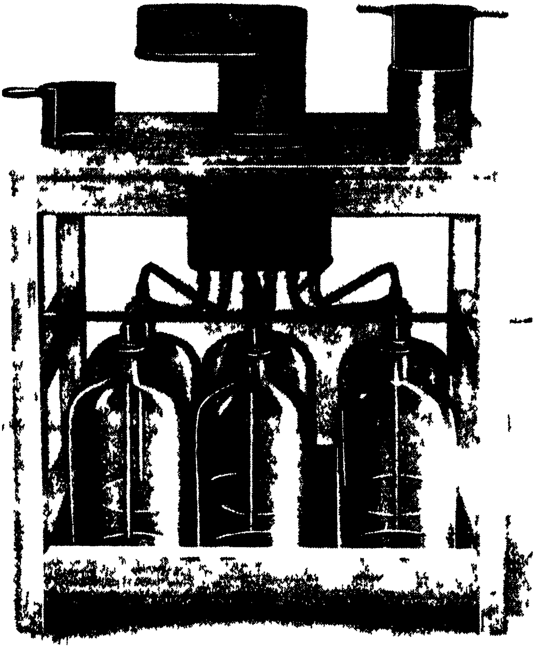

Fig 3 Float and Sink Apparatus

These and other considerations have led to the use of X-Rays in conjunction with float-and-sink methods, and Mr Leslie Thomson has carried out a number of X-Ray studies of the successive fractions obtained as the result of a float-and-sink analysis, the latter operation being conveniently carried out by means of the apparatus designed by us, and shown in Fig. 3.

The results are interesting and in more than one instance have served to throw a considerable amount of light on difficulties which were being experienced in practice where coal containing "middlings" was involved

Radiographs of two pieces of this character are shown in Figs. 4 and 5. In each case the coal present has a certain amount of shale associated with it, and the effect both of its presence and of its removal is shown in the accompanying "Ash Distribution Analysis"

Number of Sample	Proportions of Coal and Shale %		Ash Contents of Coal and Shale %		Average Ash Contents of Sample		
	Coal	Shale	Coal	Shale	Total %	Due to Coal %	Due to Shale %
Fig. 4	67·7	32·3	2·47	49·5	17·67	1·67	16·0
Fig. 5	57·8	42.2	12·8	75·7	39·3	7·4	31·9

FIG 4—Radiograph of Coal

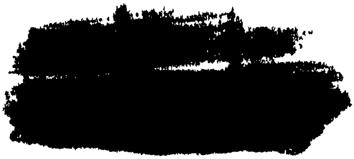

FIG 5.—Radiograph of Coal

The point of special note is the relatively *large* increase produced in the *average ash content* of each piece by a comparatively *small* proportion of shale, owing to the characteristic high ash content of the latter. In such cases very slight crushing ensures an almost perfect separation of coal and shale.

A further technique which has been developed by Mr. Thomson, not in connection with the coal-washing process directly, but on behalf of buyers of small washed coal for Power Plants and the like, has evolved from earlier work in which a sample of coal is placed in a small " jig " and subjected to the action of intermittent water pressure in exactly the same way as in a large-scale washing box. If the sample is examined by X-Rays before and after jigging, the first radiograph will exhibit a more or less uniform mixture of all the pieces present of whatever composition. The radiograph obtained after jigging, on the other hand, will present two layers if any heavy shaly matter remains in the sample, despite the large scale washing to which it has previously been subjected. The

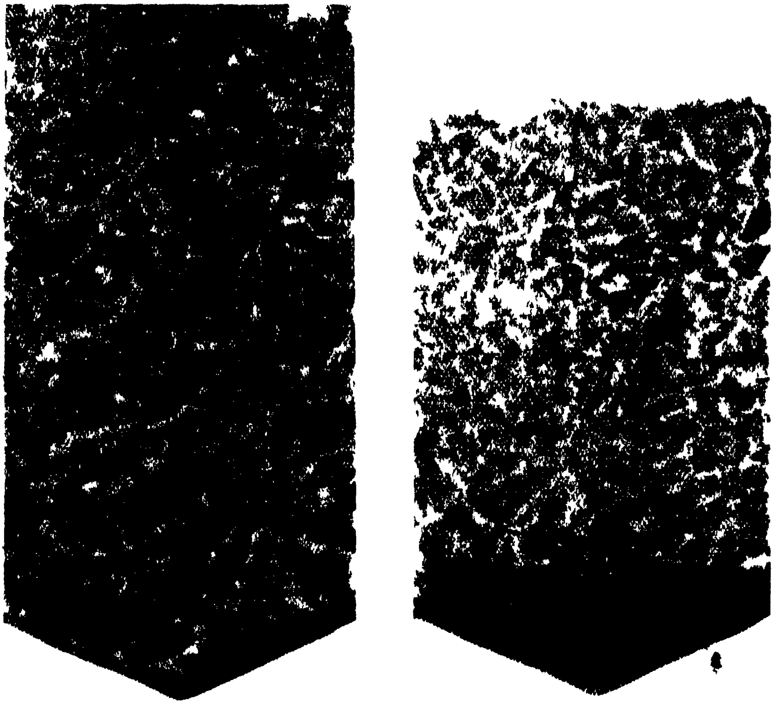
(*a*) (*b*)

FIG. 6.—Radiographs of Sized Coal (*a*) before and (*b*) after Jigging.

depths of the two layers are proportional to the quantities of the two categories present— clean coal above, and shaly matter beneath.

This method of test is described in my paper on the " Application of X-Rays to the Laboratory Jig-testing of small Coal," but the jig there illustrated has since been modified by Mr. Thomson, who now employs the form shown in the accompanying photograph.

It will be appreciated that the mere X-Ray inspection of a sample after jigging will, without proceeding further, provide a remarkably good guide as to the freedom of the sample from shaly matter which should have been removed at the washery.

In these days of specialisation in Plant manufacture it is not only possible, but easy, to obtain equipment which will clean small coal continuously and consistently down to within less than one per cent. of the "fixed " or " inherent " ash. How nearly this condition is sometimes met in practice may be judged from some figures obtained by Mr. Thomson from a series of periodical tests made on supplies of small coal for a large industrial Boiler Plant.

ASH-DISTRIBUTION ANALYSIS.

Number of Sample.	Proportions of Coal and Shale. % Coal.	Proportions of Coal and Shale. % Shale	Ash Contents of Coal and Shale. % Coal.	Ash Contents of Coal and Shale. % Shale.	Average Ash Contents of Sample. Total. %	Average Ash Contents of Sample. Due to Coal. %	Average Ash Contents of Sample. Due to Shale %
1	92.6	7.4	5.4	74.5	10.5	5.0	5.5
2	96.2	3.8	4.1	81.2	7.1	4.0	3.1
3	98.8	1.2	6.4	77.3	7.2	6.3	0.9
4	92.5	7.5	6.3	75.2	11.4	5.8	5.6
5	93.3	6.7	5.9	81.0	10.9	. 5	5.4
6	100.0	0.0	3.5	—	3.5	3.5	0.0
7	94.7	5.3	5.3	79.2	9.2	0.5	4.2
8	91.5	8.5	4.6	77.0	10.8	4.2	6.6
9	95.7	4.3	5.1	79.4	8.3	4.9	3.4
10	92.5	7.5	5.4	79.2	10.9	5.0	5.9
11	98.0	2.0	5.9	77.1	7.3	5.8	1.5
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

It is evident from the figures that the cleaning plant is able, on occasion, to lower the shale content to a reasonably low value, but that on the average it fails to do so. Further, there emerges the surprising fact that the average ash content of the coal actually supplied as a *washed* product could in many cases have been halved.

The significance of this result is apparent, and the information it affords enables coal-buying departments to maintain a much closer check on deliveries than is possible by *average ash content* determinations alone. Thus, in addition to this latter figure, it is necessary to know how the ash producing matter remaining in the coal is distributed. The failure to appreciate this point commonly found on the part of coal buyers rather justifies Iwasaki's somewhat caustic reference to coal being considered as a " black block " which in the case under consideration

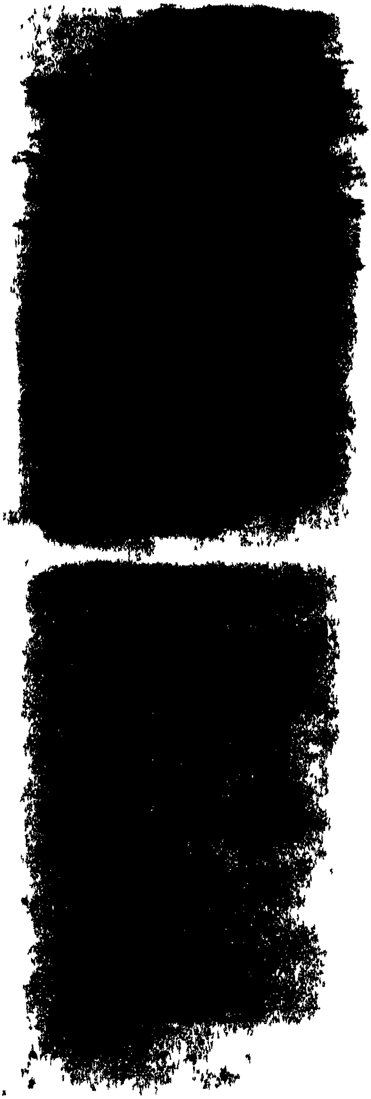

FIG. 7.—Radiographs of Coal Core.

is equivalent to the belief that *average* results provide a true index of the value of the coal.

Various other practical applications will suggest themselves, but I will confine myself to the mention of one other—the examination of coal cores. When boring operations are carried out it is desired to obtain the maximum amount of information regarding the seams pierced, and prior to the destruction of portions, at least, of the core for purposes of chemical analysis, the preparation of a radiographic record seems a highly desirable preliminary.

By the kindness of Messrs. The Sullivan Machinery Company who provided me with portions of a 2″ core, taken during prospecting operations in the North Midlands, I am enabled to reproduce the radiograph shown in the illustration

In the present lecture I have confined attention to purely radiographic methods, but mention must be made of the diffraction phenomena which accompany the passage of a fine pencil of X-Rays through most forms of matter When such a pencil of rays is received upon a photographic film after having traversed a material such as coal, various rings are found to have been produced. They vary in width and sharpness, partly in accordance with the X-Ray conditions, and partly as dependent on the particle size of the material.

An important study on these lines has recently been carried out in India by Mr. C. Mahadevan on the suggestion of Sir C. V. Raman, and the preliminary results are contained in a paper entitled "X-Ray Study of Vitrain and Durain and of their Constituents." It is indicated that much further work will be required before a full interpretation of the data becomes possible.

It appears that the fruits of further research along the lines now briefly indicated are likely to be worth gathering, and, reverting to the metaphor of my introduction, I hope that I may not be left to pursue my lonely furrow, but that others will enter the field and take part in the reaping which, according to Iwasaki, should "yield great aid to chemical technology."

In conclusion I wish to record my obligation to the Fuel Research Board of the Department of Scientific and Industrial Research, for a Grant which has enabled me to carry out most of the work which forms the subject of the foregoing review

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DISCUSSION

THE CHAIRMAN said he was struck by the importance of the method as a means of recording the variation of coal seams in different parts of the coalfields. Practically no systematic records had been made, and this was due to the fact that few methods were available for recording the structure of seams as they actually existed. In the past the method employed consisted in cutting thin slices of the seams and taking photographs of the sections ; it was then possible to compare seams from different points in the coalfields. It would appear that the technique advanced by Mr. Kemp was probably easier to apply because by viewing the layers of inorganic matter it would be possible to compare horizons and recognise similarities. The photographs would be permanent and a clear impression could be obtained of what was happening to a seam as one passed from one point to another in the coalfield.

The photographs also afforded information upon the heterogeneous character of seams. At one time he had found it necessary to measure the thin layers in seams as a means of determining the percentage of dull and bright coal present. The measurements were made to the nearest millimetre, and in some of the seams about ninety layers were observed in a thickness of three feet. The audience would remember the slide shown by the lecturer of a piece of coal about 8 inches in thickness ; if they took one particular inch of this it would be possible to count over 100 layers. This afforded an idea of the heterogeneous character of coal and the application of this knowledge was of importance in the use of coal as pulverised fuel and where coal was being carbonised as fine particles. It introduced something new into coal technology.

Dr. R. Lessing considered that one of the most significant points about Mr. Norman Kemp's most instructive lecture was his reference to early work in this branch. He had mentioned a hitherto unknown, or little known paper, published in 1897, which dealt with the radiographic examination of coal. This threw a certain light on what they were always taught to believe was in fact existing, namely, progress in industry. It took thirty-two years from the time that paper was written before there was a recognition of the important methods of examination of coal which that early paper suggested. That paper was written only two years after Röntgen's famous discovery, and the method was actually employed, but fell again into oblivion. He himself well remembered how a week or two after the publication of Rontgen's discovery he, as a school boy, obtained a copy of his paper, and it was one of his most cherished possessions. The fact that mankind were rather inclined to regard their individual lives as more important than anything else led to the seclusion of the radiographic worker in medical circles, and the desire to study the " inner man " had practically monopolised X-ray work until a few years ago, since which time it must be admitted X-ray work for industrial purposes had progressed very considerably. Mr. Kemp and his associate, Mr. Leslie Thomson, had been among the modern workers who had led the way.

With regard to the X-ray examination of the structure of coal, he was reminded of Goethe's saying that " blood is a most peculiar juice," and he would like to paraphrase that and say " Coal is a most peculiar stuff." The Chairman had already referred to the heterogeneous character of coal. This fact had been rubbed into all concerned *ad nauseam* during the last few years, and still it was necessary to work away in that direction in order to prove that in coal one had not to deal with a uniform substance. No method could show more conclusively that coal was of this heterogeneous composition, if composition it might be called, than the X-ray examination expounded to the Society by Mr. Kemp. It showed much more than any other form of analysis could do (unless such analysis were carried to the infinitely small particles of which they had heard), what was the position in regard to the particle of coal, the lump, and the seam. He thought that the stereoscopic effect obtained by Mr. Kemp and Mr. Thomson was very wonderful. It showed actually the interior of a piece of coal without any necessity for touching it by means of chemical agents or otherwise. Here was a true ash skeleton revealed, without the need for touching or altering even the surface, let alone the interior. This was of immense practical importance and not only of academic importance in the study of coal, on which Mr. Kemp, until almost the end of his lecture, had laid stress.

The lecturer had pointed out how readily processes could be controlled by this method, particularly the process of the cleaning of coal. There was no reason why in future the workman or charge-hand—if the collieries would not see their way to placing their coal-washing under the control of qualified chemists or physicists—should not have to his use an instrument sufficiently robustly made which he could employ without awaiting the result of analysis, and by which he would be able to control his processes and see what was actually happening. The work done by Mr. Kemp and his colleagues would be more and more appreciated. The industry was now in a position to clean coal in a commercial manner, but in order to do this it must have a ready means of ensuring that what could be done was actually carried out. The audience had seen on one of the lecturer's slides a comparison between clean and unclean coal—the former looked something like cotton wool—but it was necessary that the heterogeneous portions should be separated as they could be. Such work could be done, and the lecture just given would go very far to bring it home to those who ought to be interested in the subject that these methods should be and must be applied in a practical way. They would then be certainly a fruitful source of income, at all events to those who had to do with certain parts of the handling of coal, if not to the enthusiastic scientific workers who had initiated and promoted a knowledge of them.

MR. W. H. PATCHELL said that this had been a most entrancing lecture. His mind went back twenty-five years since he saw the first work by Mr. Lomax in Manchester. This was thought at that time to be wonderful, and certainly, under the auspices of Sir William Garforth, some masterly work for the coal industry was done. But he had not realised until he saw the lecturer's slides and projections why Mr. Frank Hodges had gone from coal into cotton! [This was an allusion to the cotton-like appearance of the cleaned coal shown in the slides]. He hoped that now he would stick to the cotton, and that the coal trade would follow his example and give the community something clean

MR. ARTHUR GROUNDS said that this was a subject of very great importance from the point of view of those who supplied coal washing plant. It was particularly useful because they would desire to have a ready means of checking up the performance of a coal-washing plant in its early stages. Very often when a coal washing plant was put into operation, it did not get into its full stride within the first two or three days. If a method such as the one described by the lecturer were available whereby the washed product could be examined regularly every hour, or every shift, or every day, it would simplify the work of those taking over the washing plant, and would add to the information of those whose business it was to design such plants.

It might be thought in considering the examination of middlings, that X-ray analysis or examination was rather a refined way of doing a rough job. It might be considered similar to buying a racehorse to do donkey's work. But there were certain coals in South Wales—certain anthracites—which had on the surface a dull appearance, but immediately the coal was broken a band of brightness made its appearance running right through the centre. The only method of examining such coals was by X-rays. From the point of view of the coal producer, X-ray examination was particularly useful, because it indicated the size to which the coal would have to be crushed in order to yield clean coal, and showed the dirt which would have to be discarded. This had an important economic bearing, because certain grades and sizes of coal could be sold at much higher prices than others.

The truth was that at meetings such as the present there were enthusiasts who were keen on the development of these methods, and what he would like to see was that everybody present should carry home to the coal producers and those to whom these methods could apply, the benefits which they could furnish. It was of no use for Mr. Kemp and similar pioneers to do such work unless the value of it was brought home to those responsible for producing coal, those designing coal-washing plant, and those using coal. The application of the method should be brought home just as much as the research itself.

Mr. G. K. Menzies, speaking with reference to the remarks of Mr. Grounds, said that one of the main functions of the Society was to try to do exactly what he had said ought to be done. The Society endeavoured to be a sort of half-way house between the technical experts and the industrialists, and perhaps the chief part of its work was the publication of reports of meetings like the present in the *Journal*, which found its way to a large number of people who ought to be interested.

Mr. W. H. Patchell recalled that the last time he was in the room, Mr. Llewellyn Atkinson spoke of what the Society had done since its foundation. It had lived up to the character given to it, and he hoped that this present occasion would give it a further stimulus.

Mr. W. E. Bakes had one criticism to make about X-ray methods of analysis. It seemed to him that from a practical point of view they were far too sensitive. If one showed a colliery owner an X-ray photograph of a piece of coal and told him the dark patches were dirt, he would reply, " In that case it is not a bit of good my trying to get rid of the dirt." It used to be said that dirt was matter out of place, but in the new dictionary the speaker thought that dirt would be defined as " A substance which used to be called coal." If it was desired to get rid of all the dirt it would be necessary to pulverise the coal down to more than microscopical fineness, and coal must be of a certain size, at any rate, to be of any use. Would it be possible to pulverise the whole of the coal, then clean it, and afterwards remake it into the size of double nuts ? He also desired to know whether the lecturer had done any work on similar lines to that of Mr. C. Mahadevan, which he mentioned at the end of his lecture. The speaker rather thought that this work afforded definite evidence that the Alpha and Beta fractions of coal were quite definitely cellulosic in origin. He would like to have some further details of any work of that kind

Mr. Arthur Grounds asked what would be the cost of an X-ray apparatus such as the lecturer used, which would be robust enough to be supplied either to a firm of coal owners or a firm of coal-washing appliance manufacturers.

Mr. Harald Nielsen said that after listening to Dr. Lessing's excellent lectures on coal cleaning, he was much taken with his X-ray apparatus and he had installed one for himself. With regard to the cost of apparatus for X-ray work on coal, he could inform the meeting that he purchased a 12 in. sparking coil for 52s., and an X-ray tube for 15s. He thought the whole apparatus, which was quite serviceable, cost him less than £4. It was a very rough and ready method of examining coal, but it was interesting, and when it came to the question of how much coal-people could afford to pay for X-ray apparatus, these figures which he had given might be useful. So common and cheap was X-ray apparatus that one could go into any bootshop and be fitted on the basis of the appearances of the foot shown by an X-ray fluorescent screen.

Mr. Norman Kemp, in replying on the discussion, thanked the speakers for their appreciation of his lecture. With regard to the remark about the sensitiveness of the methods employed, this was undoubtedly true. He had refrained from repeating the remarks of one coal-owner to whom a particular X-rav photograph was shown, because they would not bear repetition. This owner wanted the photographs completely suppressed.

With regard to the diffraction methods of analysis, he had not had any opportunity of pursuing the lines of the Indian research to which reference had been made. A certain amount of work had been done in other countries, not so much on coal, as on pure graphite.

With regard to the cost of equipment, this depended to some extent upon the source of electrical supply. If there was a direct current supply a rotary converter was necessary. The amount required for equipment, in round figures, might be £150, but with regard to the method mentioned by the last speaker, he might say that it was one which he had himself adopted, though he was not sure that his apparatus cost as little as £4. But it was necessary to impress upon all concerned the very grave risks incurred by using X-ray equipment in a casual way, and by placing it in the hands of routine workers other than those who were acquainted with the physical and biological conditions involved. It was necessary to work in strict conformity with the regulations of the X-ray and Radium Protection Committee. He did not know to what extent members of the audience had ever met those who were called X-ray martyrs, but he himself had met several, and there were few more tragic sights than a man who had lost fingers and limbs through injudicious exposure to X-rays. In these days there was no excuse whatever for such exposures. The methods of protection were thoroughly known and understood. But the use of improvised apparatus was certainly accompanied by great risk, unless it was used, say, once in two or three months, in which case it was almost of no practical utility. This question of protection was put in the forefront of the requisites, and the cost was partly governed by that consideration, namely, the need of providing something which was electrically safe, radiographically safe, and at the same time robust enough to do the work for which it was designed.

He wished to express again his gratitude for the way in which his paper had been received. The paper was no more than a review of progress up-to-date. It described a certain amount of work in a field which, as several speakers had indicated, held much further promise.

The Chairman said he would like to make an observation upon the cost of the equipment. The figure of £150 had been mentioned, but it must be borne in mind that when this sum had been expended the worker had done, to all intents and purposes, all his ash determinations. A constant supply of samples could pass over the instrument and the information was obtained instantaneously and adjustments could be effected, whereas when the samples were sent to the laboratory it took some hours for the report of the test to reach the washery. The sum of £150, moreover, represented the salary of a very junior chemist and instead of all the labour associated with the tests in the laboratory, one had an instrument which did the work for a relatively small outlay.

He wished to express on behalf of the Society very hearty thanks to Mr. Kemp for his delightful and interesting lecture.

The vote of thanks, having been proposed, was carried unanimously and the meeting terminated.

OBITUARY

THE HON. SIR JOHN COCKBURN, M.D., K.C.M.G.—Sir John Cockburn, who died on November 26th in King's College Hospital at the age of 79, had been a prominent figure in Australian circles in London for the past thirty years. Born at Corsbie, Berwickshire, on August 23rd, 1850, he was educated for the profession of medicine and took the degree of M.D. at London University. At the age of 25 he emigrated to South Australia and speedily interested himself in politics. He became Mayor of his town at the early age of 27, and later was elected to represent Burra in the State Parliament, where he played a prominent part, becoming Minister of Education from 1885 to 1887 and Premier in the years 1889-90 Later on, he held other offices, being Chief Secretary in 1892 and Minister of Education and Agriculture from 1893 to 1898, when he retired from political life to become Agent General for South Australia in London. He had been one of the South Australian delegates to the 1897-98 Federal Convention which was eventually successful in framing a Constitution, and in 1901 he read a Paper before the Society on "The Commonwealth of Australia," for which he was awarded the Society's silver medal. Subsequently he contributed Papers on "The Sphere of State Activity in Australia," "The Biology of Federation," and other subjects, and was also a frequent participant in the discussions at the Society's meetings. At the time of his death he was a member of the Dominions and Colonies Section Committee, on which he had served for many years.

NOTES ON BOOKS

INDUSTRIAL CARBON. By C. L. Mantell, Ph.D. (Pratt Institute, Brooklyn.) London : Chapman and Hall, Ltd. 21*s*. net.

Of all the elements, carbon impresses us most by the extraordinary variety of its industrial applications. Iron must no doubt be admitted to possess greater economic utility, and mercury might perhaps claim to excel in sheer versatility in the laboratory ; but a short examination of this interesting volume will suffice to convince the reader that neither of these could equal carbon in the width of its industrial range.

To begin with, carbon has the advantage of existing in three different solid states—diamond, graphite, and a group of forms such as lamp-black, charcoal, gas-carbon, etc., which are usually classified together as "amorphous" ; and its properties in these states are so different that one might almost be dealing with three different substances.

The author makes some attempt to keep his treatment of the three forms separate, but considerable overlapping is unavoidable. He begins, however, with a chapter in which the whole of the information on diamonds is concentrated. This, indeed, is not a great quantity, but it serves to illustrate the fact that much of the practical utility of carbon arises from the *extremeness* of its properties. Thus the diamond is the hardest of minerals, and is therefore extensively used in glass-cutting, rock-drilling and wire-drawing ; it has also a quite abnormally high refractive index for light, whence it derives its eminence as a precious stone. It is shorn, however, of the supernatural physiological effects with which it was credited in early times ; and if it can still claim to be "the peacemaker between husband and wife," the mechanism of pacification is not quite what was formerly supposed.

The softer forms of carbon, such as graphite and gas-carbon, owe much of their economic value to their possession, in an extreme degree once more, of the qualities of infusibility and incorrodibility, to which must be added the unique property of being at once a non-metal and a passably good conductor of electricity. This combination of three rare characteristics provides the foundation of the great carbon electrode industry. Economically, this is now probably the most important application of carbon, since the output of electrodes in the United States alone reaches an annual value of over ten million dollars, as against ten thousand dollars in 1899.

Carbon electrodes vary greatly, both in composition and method of manufacture, as is only to be expected when we remember the range of different purposes served by the electric furnace ; electrolytic, when the current brings about the necessary chemical change, as in the manufacture of aluminium ; " electrothermic," when the chemical change is caused merely by the high temperature attained, as in the manufacture of calcium carbide, carborundum and artificial graphite ; and purely thermal, as when fusions and heat treatment of alloys constitute the objective. All these considerations, together with many others, are examined by the author in great detail in this section, which is probably the most valuable part of the book.

The qualities already specified, or some amongst them, account for the use of carbon in the form of electrodes for arc light ; of contact-brushes for dynamos and electric motors, the American annual output for this purpose alone being valued at from six to ten million dollars ; and of crucibles and furnace linings adapted to bearing the highest temperatures that we can produce.

Carbon next presents itself to us in an entirely fresh capacity, namely that of an adsorbent. Industrial adsorption may be briefly described as the removal of some substance from vapour or solution by inducing that substance to condense itself in the form of a film or skin on the surface of a solid adsorbent. For some reason, no doubt connected with its unusual power of breaking down into most minute particles, carbon is one of the most powerful adsorbents known. Amongst the earliest practical applications of this property was the use of charcoal for decolorizing crude sugar solutions: the solution is simply brought into contact with the charcoal, and the colouring matters are adsorbed to the surface of the latter. The same principle is now coming to be more and more used in the extraction of the precious metals from solution. Similar adsorbtion of substances from gases and vapours also received early application in the use of charcoal as a deodorant ; but of course was raised to a high-water mark of importance by the war, when charcoal was widely used in gas-masks to remove poison gases from air before respiration. Very different forms of carbon are needed for these varying purposes, to which in more recent years has been added the recovery of valuable volatile solvents from mixed vapours ; but the two main types are bone-black, produced by the high-temperature charring of bones ; and vegetable chars, from various woods and woody substances. Excellent information, both practical and theoretical, is given in the chapters dealing with this subject.

In relation to this unusual capacity for sub-division is also the use of graphite as a lubricant : the soft soapy feeling of the substance is due to the extreme willingness of slip-planes to develop within the grains, which are thereupon further broken up, the upper parts sliding on the lower. A still further use of this important property, together with the deep black colour of soft carbon, is made in the pigment industry Almost every printing-ink owes its blackness to carbon, either as lamp-black or some similar deposited black ; and many other pigments and pigmented products contain graphite. Lead pencils, of course, are a case in point : " there is no dog in dog biscuit, nor lead in lead pencils," as our author remarks.

Lack of space will hardly permit reference to still further most important uses of carbon—such as its fuel-value and its position as an essential constituent of all the older steels—which receive treatment in the book. Though it is in some degree marred by certain faults both of method and of finish, the volume is nevertheless a valuable addition to the text-book literature, and will appeal to a large circle of readers.

AN INTRODUCTION TO MODERN ORGANIC CHEMISTRY. By L. A. Coles, B.Sc. (Lond.), A.I.C., Senior Chemistry Master, Batley Grammar School. London: Longmans, Green & Co., Ltd. 7s. 6d. net.

While the last twenty-five or thirty years have brought about something like a revolution in the methods of teaching the more advanced portions of organic chemistry it must be admitted and regretted that more conservatism has been shown in the matter of the student's first introduction to the subject. It is not easy to indicate in a few words the precise nature of the point, but it relates without doubt to the deeper and more graphic realization of the objective certainty which now attaches to our inferences concerning the structure of organic molecules. It would hardly be too much to say that the advanced student is encouraged to imagine the organic chemist as building up substances with a facility almost comparable with that of a boy building a model from Meccano parts, and with something approaching an equally clear picture of how the model is progressing. Needless to say, we are not concerned here with the problem of " ultimate reality," which is not one of the problems the scientific investigator sets himself to solve ; all that is meant is that atoms and molecules are as real as (say) houses, and that the organic chemist's diagram of the positions of the atoms in the molecule will in many cases approach in reliability his plan of the rooms in his own house, and will stand in similar relation to ultimate truth.

Nevertheless, some inhibition appears to render teachers reluctant to present organic students with this information from the start. In the present text-book, written by a teacher of experience and enthusiasm, no structural formulas at all are given in the first eighty pages ; in just the stage, that is to say, when the student may be assumed to be bewildered by the novelty of an unfamiliar subject, and to be most in need of a concrete pictorial representation. It cannot be that any doubt is felt as to the validity of structural diagrams, which are naturally used freely in the remainder of the book ; while to suggest that they would confuse the new student is almost analogous to suggesting that the study of geography would be simpler if there were no maps. In short, one must hope that the time will come when it will be recognised that the formula C_2H_3OCl (used exclusively and frequently in this opening section), is not an easy, but an excessively difficult, representation of the acetyl chloride molecule.

Reference having been made to this fundamental difference of opinion, it remains to add that these eighty pages set forth in an able and very interesting manner the main elementary facts relating to ethyl alcohol and acetic acid, together with an account of the methods used in arriving at empirical and molecular formulas. The nature and derivation of structural formulas are then explained, and the rest of the book deals systematically with aliphatic and aromatic compounds, up to and somewhat beyond the standard usually demanded in a university intermediate examination.

The instructions for laboratory preparations contain features of unusual merit. The author's criticism, that such instructions follow only too often the early original papers dealing with the various substances, is well-founded, and his attempt to substitute where possible later and better methods should prove valuable ; though an exception to his principle is noticeable in the case of ethyl iodide, where improvements on the method given have been available for many years

Reginald A. Mant, K.C.I.E., C.S.I.; Sir George Marjoribanks, K.C.V.O. Col. Sir Henry McMahon, G.C.M.G., G.C.V.O.; Mr. J. A. Milne, C.B.E.; Sir George Sutton, Bt., and Lt.-Col. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., with Mr. G. K. Menzies, M.A. (Secretary), and Mr. W. Perry, B.A. (Assistant Secretary).

A letter was read from Lord Bledisloe, resigning his seat on the Council on his appointment as Governor-General of New Zealand.

The following candidates were duly elected Fellows of the Society :—

Alexander, Lieut.-Colonel Maurice, C.M.G., K.C., B.C.L., London.
Alexander, Miss Rachel F., London.
Baron, Louis Bernhard, London.
Biltcliffe, Mrs. Lina, Low Fell, Gateshead.
Binning, The Rt Hon. Lady, London.
Boving, Jens Orten, St. Leonards, Herts.
Carlisle, Hildred, London.
Carpenter, E. H. O., London.
Castlestewart, Countess, Nutley, Sussex.
Cohen, Fred, London.
Eadon, Alan Theodore Eden, Edgware, Middlesex.
Fildes, Frank Cyril, Newcastle-on-Tyne.
Hughes, C. E., Orpington, Kent.
Knight, Arthur Horace, F.A.I., London.
Lee, Lennox Bertram, J.P., London.
Lowis, Mrs. R. F., Binfield, Berks.
Maxwell, Donald, Borstal, Rochester.
Middlecoat, George Keith, London.
Mileham, Harry Robert, Hove, Sussex.
Mills, Arthur Wallis, London.
Moll, Otho Charles Henry Leopold, Gillingham, Kent.
Morison, Bruce, Salisbury, Rhodesia.
Murray, The Hon. Mrs. Graham, London.
Neasham, G. W., Eastbourne.
Perry, William, J.P., Brisbane, Australia.
Piper, Miss Elizabeth, A.R.E., London.
Rigg, Major Richard, O.B.E., T.D., J.P., B.A., London.
Siddle, W., Middleton St. George, Co. Durham.
Spanton, Miss Mabel, B. W. S., London.
Smythe, Richard, Hampton Hill, Middlesex.
Thorowgood, Wilfred E., London.
Tyrwhitt, Walter Spencer Stanhope, B.A., Oxford.
Wethered, Vernon, B.A., London.
Wederkinch, Holger, Charlottenlund, Denmark.
Welsh, William, Harrow, Middlesex.

It was reported that the late Mr. Herbert Louis Leach had bequeathed the sum of £100 to the Society, and it was resolved that this should be used towards the reduction of the debt on the Society's house, which now amounts to about £4,000.

On the recommendation of the Examinations General Purposes Committee it was resolved to hold Course Examinations in 1930 at Kingston, Jamaica. The arrangements for the Examinations will be in the hands of the Board of Education, Jamaica.

Mr. P. Morley Horder, F.S.A., was appointed as one of the representatives of the Society on the Council for the Preservation of Rural England, in place of the Secretary.

A resolution with regard to the proposed establishment of a National Park in Great Britain was unanimously passed (see below).

A quantity of financial and formal business was transacted.

NATIONAL PARKS

The following resolution was passed by the Council at their meeting on December 9th :—

> The Council of the Royal Society of Arts view with profound satisfaction the progress of the movement for establishing at least one National Park in Great Britain. They understand that the object of a National Park is " to conserve the scenery and the natural and historic objects and the wild life in areas of unusual scenic beauty in the United Kingdom, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."*
>
> The Council are pleased to remember that the movement was initiated at a meeting of the Society over which Lord Bledisloe (now a Member of the Council) presided.

It was resolved that copies of this resolution should be forwarded to the Committee on National Parks and to the Press.

*This definition is adapted from the wording of the Organic Act of the United States Congress of August 25th, 1916, establishing a National Park Service.

SIXTH ORDINARY MEETING

WEDNESDAY, DECEMBER 11th, 1929. MR. JOHN MAUGHFLING, C.A., in the Chair. A paper on " Overheads and other Factors influencing Road Transport Costs, from an Engineer's Viewpoint," was read by MAJOR CHARLES WHEELER, O.B.E., M.I.A.E., formerly Chief Automobile Engineer of the General Post Office. The paper and discussion will be published in the *Journal* dated December 27th.

HISTORY OF THE ROYAL SOCIETY OF ARTS

Further copies of the History of the Royal Society of Arts by the late Sir Henry Trueman Wood, the existing supply of which was recently exhausted, are now available, and can be obtained, price 15*s*. net, on application to the Secretary. The History, a large octavo volume of 558 pages with a large number of illustrations, gives a well documented account of the many and various activities of the Society from its foundation in 1754 to the year 1880.

PROCEEDINGS OF THE SOCIETY

◆

FIFTH ORDINARY MEETING

WEDNESDAY, DECEMBER 4th, 1929

SIR LAWRENCE WEAVER, K.B.E., in the Chair

THE CHAIRMAN, in introducing the lecturer, said it gave him great pleasure to take the Chair on that occasion, for a variety of reasons; in the first place because he was a great believer in Mr. Harry Peach, who was an old friend of his, and, secondly, because he was an advertising man and felt that the business of advertising was in some sort on its trial, and properly on its trial, in connection with the pollution of the countryside, and, thirdly, because where there was a fight he liked to be in it. The fight on the present occasion was for no less than the preservation of the decencies of England, and he was very glad that such a doughty fighter as Mr. Peach was in it. Mr. Peach recognised the well-known principle of "When you see a head, hit it." A lot of people had said to him that Mr. Peach was an ungentlemanly fellow, because he spoke with undeniable plainness. He thanked God for that.

Mr. Peach had spoken very often and very harshly to him because he had not fought sufficiently hard in some of the good causes in which Mr. Peach had himself been a doughty fighter.

He supposed that most of those present knew of the case of Mr. Plimsoll. Rascally shipowners were sending to their death crews in ships which were overloaded, and it was perfectly well recognised by everybody that if you sent to sea ships thus overloaded, and a serious tempest descended on that ship, the ship would go down, and with it all the people who were working the ship. Ships continued to go to sea in that condition. Mr. Plimsoll was like Mr. Peach—an exceedingly ungentlemanly person—and in Parliament and out of Parliament, in season and out of season, he said that this thing was a crime and a scandal, and he so annoyed all the gentlemanly and ladylike people that ultimately he succeeded in getting an Act passed which prevented a ship going to sea if the cargo weighed down the ship below a line painted on the ship. Thus the extremely ungentlemanly Mr. Plimsoll was responsible for a very great reform. He looked upon Mr. Peach as another Mr. Plimsoll.

The following Paper was then read :—

THE ADVERTISER AND THE DISFIGUREMENT OF TOWN AND COUNTRYSIDE

By HARRY H. PEACH,

Hon. Secretary, Council for the Preservation of Rural England Exhibition Committee

The disfigurement of town and countryside through advertisement is of comparatively recent growth, especially the latter, which dates mainly from the development of the motor car. It has increased recently with such great rapidity that the question is now forcing itself upon a public which has become very hardened to its surroundings and has little appreciation for refinements of beauty in landscape or architecture.

The increase of the motor car among all classes has sent them out into the countryside and they have been shocked at the untidy mess made by most garages and offended at the vulgar shouting signs which spring up behind hedges and often invade what the public have been led to recognise as a beauty spot. I propose this evening to deal first with some of the various forms of advertisement on the countryside with criticism of them, and then with the advertiser's refinements of cruelty to the town (for alas no other word expresses it), and some suggestions for the future.

Let us begin with the garage and some examples of the various forms of disfigurement this causes.

This example is on the Yorkshire moors between Scarborough and Whitby, and you will note the unnecessary mess which the various firms' signs have made around a not-too-tidy shed.

The list of signs is as follows :

1 Raleigh, 3 large B.P., 3 Bicycle, Large Pratt, Player's, Benzole, Castrol and other small signs.

Next is one on the Coventry to Dunchurch Road, a beautiful road mentioned in ' Tom Brown's Schooldays." The old farmhouse at the Straight Mile corner had its garden wall removed and on the magnificent beech was a Pratt sign. I sent a protest to the Petrol Company and the Pratt was removed to a barn at the side and this took its place. On the other side of the tree is this mess, and it is sad to see our Union Jack prostituted to this unpleasant use. The Government hold shares in this company, and they and the directors ought to know better.

But that is not all. Other trees are disfigured and the 100 yards before arrival are messed up with other signs.

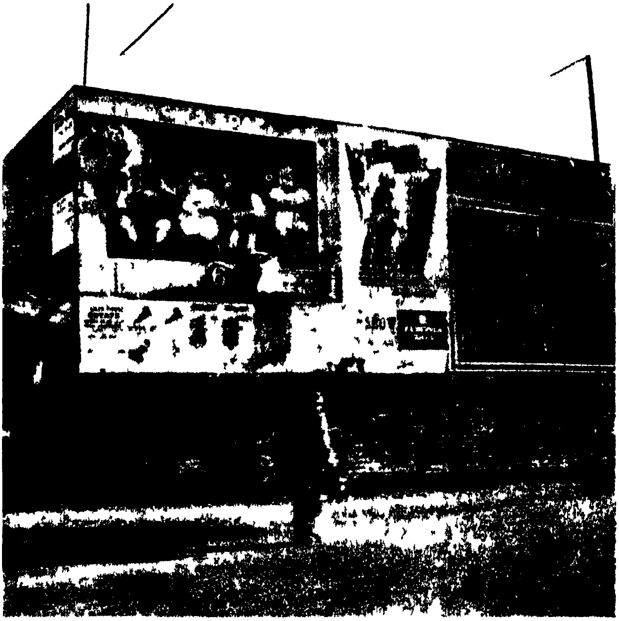
It is not so much the pumps that disfigure the countryside. They are functional things and as such are shaped for a purpose. If painted a green or neutral colour certainly they are better. It is the advertisements around the garage which are really of little or no use. I doubt if anyone in the room can say they have been the least influenced by these blatant signs beyond being annoyed by them. The latest abomination in this way is the R.O.P., a form of Russian propaganda to which the late Home Secretary could really have turned his attention with much more reason than some of his other anti-Russian exploits.

Among other advertisements they persuade the garage owner to paint his roof and cause the mess as now seen too often. One garage owner told me the Warwickshire County Council had made him remove a number of signs. He had a yard full, and yet he was pestered every week by the advertisers trying to persuade him to put up others.

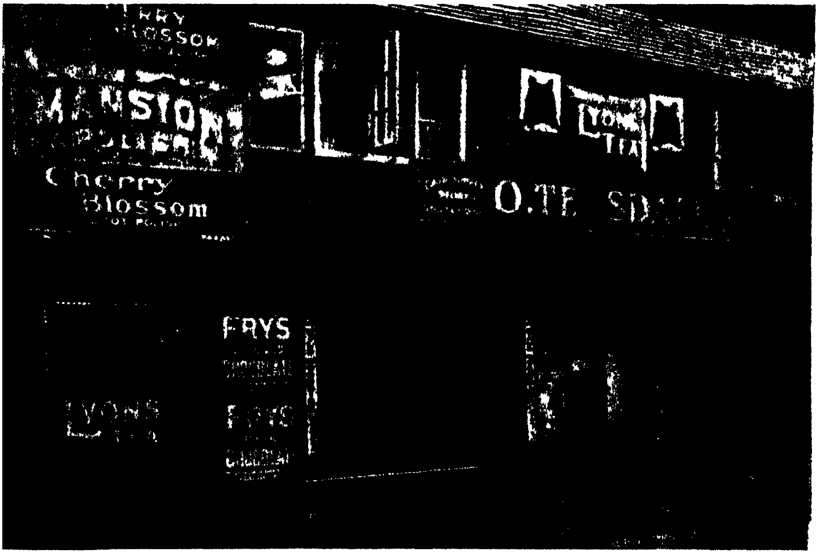
The large advertisers and the agents have a host of men with motors and signs, who go round the country trying to persuade the garage owner, tearoom and other small shopkeepers to let them put up signs. Nothing is paid for these but the

Wolston, Warwickshire One end of the village Green

Wolston, Warwickshire The other end of the village green There are 3 bicycle signs on the cottage and numbers of enamel signs opposite



Wolston, Warwickshire Hoarding adjoining village green



Wolston, Warwickshire One of the village shops disfigured by enamel signs and person is told they will bring business. The trouble is that the moment one sign goes up the flock of enamel sign harpies pounce on the site and the end is the mess like the following. I counted 64 in one village apart from paper bills.

The worst disfigurement of the villages are the enamel signs of Lyons' tea, which are found from one end of the country to another, an unpleasant red, dark blue and white sign, sometimes four or more on a shop front.

Next to them is the cigarette—Wills' and Player's being the two most prominent and insistent. Then follow baking powder, cattle cake, polishes, starch, mustard, chocolate, etc.

The land and property owner could do much to help in keeping enamel signs and advertisements from buildings or his land by putting in a clause in agreements as suggested at the Leicester Countryside Conference, a copy of which can be had from the Scapa Society or C.P.R.E.

It is rather sad to think that the worthy heads of many of these firms, who are so interested in welfare and other amenities, cannot realise that this disfigurement of the town and countryside does rather make their other work illogical.

The next form of disfigurement is the hoarding and roadside sign of which the Raleigh sign is a very unpleasant form both in design and colour, and which pops up at you from gardens, orchards, hillsides, etc. No doubt it brings some income to the owner of the land, but yellow is peculiarly unpleasant either by roadside or on buildings.

They have removed some lately in my own district and we all hope more will follow.

The advertiser has a queer outlook, and I should like here to quote from a letter I had in reply to a protest about a hillside sign in Wales:—

> " Yes, I do recognise this photograph, it is at Capel Curig and I actually stayed in the cottage shown on my holiday last year. This sign does not in my opinion spoil any view as you will see it has only rough rock and grass, heather and trees behind it. There certainly is some scenery facing it a good way over, viz., a mountain in the distance."

Another advertiser once accused me of taking the bread out of the poor widow's mouth by trying to stop roadside signs. I reminded him, firstly, that his interest in the widow was purely a selfish one, and secondly, that the politician had played on the poor widow string so often that it was really worn through.

The roadside barn is another source of income and here is an example. An American leaflet I had sent me showed a similar one with this comment underneath—

" Mr. Farmer, is this your barn ? " I am glad to say that, bad as farming is in this country, it is not often the real farmer who allows this sort of thing.

The hotel notices at crossroads and entrances to towns are not much credit to the trade. The entrance to Warwick is an awful mess with these and here are some other signs. Most of us avoid such places as advertise in this way. The Ilkley neighbourhood has a lovely view of the Wharfe spoiled by a terrible Hydro sign.

The brewers have recently taken to blistering the walls of their inns with great notices of their beer. The good old proverb, " Good wine needs no bush," is either forgotten or perhaps does not apply nowadays.

Some local papers still have a nasty disease called flybilling, that is the indiscriminate placing of bills on fences, hedges, trees, etc. and it is occasionally caught by the billposter. I had occasion to effect a cure locally not long ago when a local paper had an eruption. A little personal persuasion from those in authority will usually stop it, but if you have a litter byelaw you can prosecute under that if the bills lie about. One is glad to see in this respect that the small bills that used to be put on gateposts by flybillers have practically dropped out.

One large firm who stopped it on grounds of decency said that it not only saved them money for decent advertising but that it had been proved useless. I expect a good deal of this country advertising would really come under the same category if the truth were known.

Another unpleasant form of disfigurement of the countryside is the railway-side advertisement. Why we should be reminded that we need liver pills every time we travel, I don't know. A facetious friend recently suggested that we might put one of these signs in the delightful village in Derbyshire in front of the advertiser's own house and see how he liked the daily reminder.

The distemper men also cause much bad temper to those travelling.

The "Yorkshire Post" and some other papers are also offenders, and I am sorry to say even the excellent Technical College at Loughborough has a huge hoarding advertising the College in the Soar Valley.

I am informed by the Scapa Society that most of these are coming down under the 1925 Act when the five years exemption is up.

This form of advertisement can be kept down, I believe, easily if the Advertisements Regulation Act were more strictly enforced by County Councils, most of whom have now adopted it.

In its early days it was considerably checked by the application of the Act. Could not the County Councils also enforce the doing away with the great signs showing us that we are arriving at a petrol station or garage and adopt some standard sign like those adopted for schools, etc.? This has been suggested to the A.A., who could really do something in this direction as they also could with tidying up garages if they would take the trouble. They might also make their own signs less aggressive and get them better designed.

By the bye, why do we want those yellow signs at bridges at all? The Leicestershire A.A. recently adopted a resolution only to patronise pleasant petrol stations, and I believe if this were adopted all over the country it would help to clean up garages and petrol stations faster than the new Government regulations.

With regard to the countryside, I have failed after much discussion with advertisers and others to find any solution or suggestion except the total abolition of all advertisement except a decent and orderly treatment for the garage and trade sign to shop and inn, and along with many others I feel that the roadside sign with its bludgeoning, the great notices on bridges, the enamel signs on shops and barns, are a discredit to the manners of the great advertising firms and their agents, and am convinced that before long, unless they realise this and have the decency to remove their disfigurements, it will react on the public, who will, as many already have done, boycott the articles advertised.

Turning to the problem of urban advertising, we have in self protection to become so hardened to its hideousness that I find most people have unconsciously become oblivious to the advertisements which disfigure street and building, except where some new bludgeoning method makes its vulgarity unavoidable. I tested a number of people on a bus by which I travel daily, about the hoardings on a pleasant tree-lined road with about 100 yards of advertisement behind the trees. Before the election an advertisement bearing the legend "See what the Conservatives have done" came in the middle of some vulgar beer notices. Only one person I asked had ever noticed the joke.

There should be legislation to prohibit hoardings on pleasant roads like this. The only justification is that it hides the railway and cemetery where, alas, our trying to shout each other down in life is often repeated, or we should have the quiet local stone and not blatant white marble, a most unsuitable material for our climate. Some say it is a result of the letter and not the spirit of classical education.

One of the most serious menaces to the amenities of our towns, however, is the new form of disfiguring the fronts of buildings with great signs, and the brutality with which the companies offer these sites does not do them much credit.

Here are some examples from a booklet I recently had sent offering me space. The advertising agent calls this form of advertising "the greatest good." What do you think? This has defaced London in a way most discreditable to the centre of a great Empire, and how the advertiser can reconcile this with his education as a gentleman I fail to conceive. This form is now spreading to the provinces. One of the first in Leicester is next to a new garden near Simon de Montfort's old castle, and the beautiful church where Chaucer was married. A good citizen gave a square opposite, but I hear the Corporation are placing a public convenience in it. The sad story of the little squares in this country may be told here. Here are the entrances to one, here are some of the advertisers' and shopkeepers' embellishments, here are the remains of the Election, in spite of the C.P.R.E. asking every candidate to clear up when he cleared out. Then the Corporation finishes the story with a convenience.

But there is another way of treating a little square. Squares should be for public uses, not public conveniences.

The problem of the shop front and the shop fascia, where each firm tries to shout the other down, is another sad disfigurement to the street and very often to our once pleasant country towns. Have you noticed how many of Newbury's beautiful old houses have been ruined by unsympathetic treatment? Uniformity in lettering on the fascia as in the example here shown helps to make the pleasanter street.

I think we can safely boast that Leicester is the best lettered town in the Kingdom, thanks to our School of Art and the work of one man, Mr. B. J. Fletcher, for many years its headmaster. Had it not been for him and his teaching I doubt if I should have been here with you to-day.

Another serious menace, and perhaps the worst to all architecture, is the enamel sign. I am surprised that architects all over the country have not been up in arms about this and demanded legislation to prevent, along with the former method, the spoiling of the fronts of buildings. What encouragement is there to any man to build decently when his neighbour can be as unneighbourly as this ?

The enamel sign commences almost immediately any little shop opens. Cigarettes are usually first, and they have carried their disfigurements to a refinement of brutality not equalled by any other advertiser. The cigarette advertisement disfigures more shops and buildings than probably any other form. It is much worse than petrol.

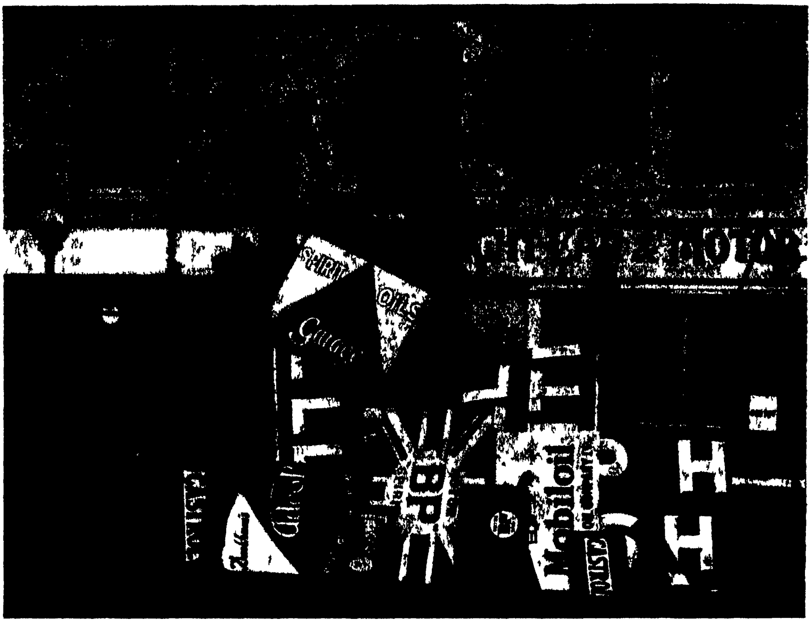
It requires a curious mentality for the directors of these companies who are causing the terrible defacement of our towns, if they are educated men, to reconcile this with their benefactions in other directions, and yet not see how illogical such an attitude is.

Also, seeing this firm has such a monopoly of the trade, ought they not to set an example, which they would be quite able to do ? It is no good, as one so often gets told, " Oh, our advertisement agent or manager does that." The heads of the large concerns who are defiling our towns and countryside are the culprits, or as a writer in one of our leading papers recently called them, they are the " advertising huns " Next after cigarettes, tea, starch, mustard, polishes, soaps and chocolates, are the chief sinners, and one is rather surprised to find here that the enlightened firms who build garden cities are among the disfigurers of our back streets. I wrote to one of these firms who I knew might be sympathetic and received the following reply :—

> " We sympathise with the objects of the Countryside and Footpaths Preservation Society and have, for many years past, made it a practice to avoid disfiguring beauty spots with enamelled plates or roadside signs.
>
> With regard to advertising on shop fronts, we have cut this practice down to a minimum, but in view of the activities of some of our competitors, we cannot see our way to eliminate this form of advertising altogether. You may rest assured, however, that in no case will our advertisements be fixed in such a manner as would seriously offend the susceptibilities of those who desire to enjoy the beauties of the countryside."

Advertisement is very like armaments, and just as we fear armaments may ultimately ruin our civilisation, so will advertisement, unless very quickly checked, help to ruin our towns and countryside.

I am glad in this connection to say that the Shell-Mex Co., whose signs were one of the worst offenders, decided not to issue any more and are prepared to do their best to get signs removed from garages that caused disfigurement. A number n the Midlands have been removed, but some of the small garage owners refuse



Garage at Theale The enlightened garage owner, thanks to the encouragement of the Shell Company, taking down enamel signs is seen cleaning up his corner of England

to take them down on various grounds They have cancelled 11,000 agreements and removed some thousands of signs. As they are continuing the campaign one can only presume that Shell sales have not suffered.

A friend, recently travelling in America, told me that in a 90 mile run through lovely country he was never once out of sight of advertisements. Now, we are not going to allow that sort of thing, if I know my fellow countrymen aright.

Here is the Billposters' point of view taken from a prominent journal of theirs for November.

> "Bill posting is spreading into all parts of the country. The great increase in the use of the roads means that the advertiser must make an effort to reach the crowds who travel by charabanc and motor-bus. Efforts to stop bill posting in *rural areas* will be just as effective as Knut's command to the waves."

What is your opinion, gentlemen ?

I was much amused recently at a circular that came in asking me to advertise on the Nigerian railways. We get accused by our friends abroad of sending missionaries and then guns and whisky to the poor benighted heathen, but we might do better than teach him how to mess up his stations as we have done.

No doubt you all saw the article in the *Morning Post* about advertisements in Lebanon and on the Sphinx.

It amuses me to see worthy people working themselves up over litter and yet they cannot see that we are encouraging everyone to be untidy by the more permanent litter of advertisement we are spreading over our civilisation. In the provinces one suffers much from the temporary bill board which well intentioned societies ask you to place on your garden fence. The roads get lined like this (slide). Now, our friends abroad have largely solved this problem by the kiosk which we might with advantage adopt here.

In Germany these are called Litfass pillars and Berlin has some 3,000 odd of them. They arose from a flybiller putting his bills on pumps at street corners, when he conceived the idea of putting up these pillars. When I get to a German town I always go to a Litfass pillar and there are all the theatre notices, concerts, lectures, political meetings, etc., in a decent and orderly form. The Swiss have the best of these I have come across in Zurich.

The kiosk idea is worth very serious consideration and it might be possible to combine it with a number of our littered small erections, such as telephone boxes, ambulance boxes, rubbish containers, sand bins, many of which are poorly designed. The C.P.R.E. might do well to suggest to its constituent architectural bodies to get out some designs for orderly treatment of them, with distinctive signs for their use.

And speaking of Zurich, here are some more examples of how public opinion has made advertisement into an orderly and quite decent affair.

I daresay some of our outdoor advertisers will not like it, as apparently all the advertising spaces in a town are regulated by the town council and let to one firm, though I believe the individual shop has certain rights, but public opinion in the main keeps these in check. A letter from the director of the Swiss Union of Towns is here interesting.

> " The Swiss towns without exception have made an agreement with the Universal Poster Company, which guarantees to this Company alone the right to put up posters. The conditions of the town administrations, which will interest you, are as follows :—
>
> 1. The town is authorised to demand the removal of hoardings and pillars on aesthetic grounds at its expense.
> 2. The poster company has to erect and maintain the hoardings in an inoffensive way.
>
> Further rules guaranteeing a tasteful arrangement of the posters do not exist. It is consequently solely the merit of the Universal Poster Co. that they set out the posters in the effective and beautiful way which you rightly praise. It is to be noted, above all, that if unpleasant posters were used and posted in ugly ways the public would very soon become openly critical. On these grounds the poster company will take great care to avoid being blamed for bad taste.

The posters at Zurich, in main streets, are 4 ft. by 2 ft. 9 ins. and these are mostly in one row only, though sometimes two rows are allowed. The hoardings are simply framed in and the limit of size of poster gives the artist much better scope than our large bludgeoning posters, which I am told the Americans have now lengthened as cars go so fast that they cannot read upright ones properly, so I suppose some bright advertiser will lengthen out here soon; in fact I see they are now beginning.

One hoarding on a pleasant square with fine buildings around had granite pillars at each end and a border of flowers underneath. As you would expect, the pretty blue and white trams have no advertisements, nor the orderly tram shelters and station fronts.

Our attempts, and few they are, of orderly advertisement are all far too big, except the example of the Empire Marketing Board. City Corporations might set an example by having similar boards and insisting on each department having standardised notices instead of allowing one to shout the other down like this example, which is typical.

The President of the Poster Advertisers' Association wrote recently to the press saying that Sir Reginald Blomfield had designed a hoarding for them, suggesting therefore that no one could now complain of hoardings. The frame is only part of the job, though it is important as giving orderliness.

They also have pointed out how their hoardings hide tip heaps, etc.

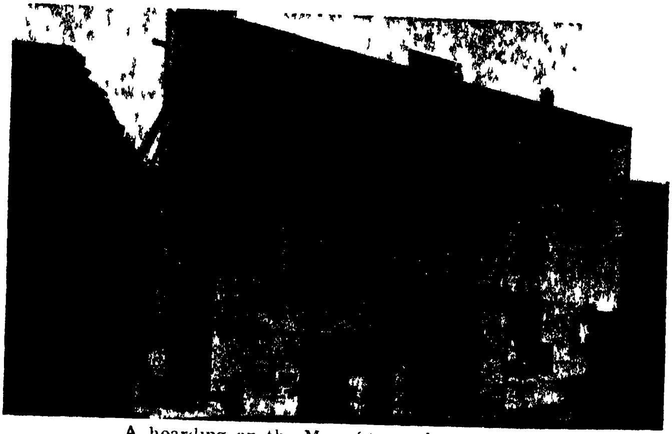
Here is a comment from one of their papers, criticising an article of mine on Zurich, and some examples of what they call orderliness in advertising. The writer goes on :—

> " These types of hoardings are pleasing and unobjectionable, and I feel sure that to reasonable thinking men they offer a satisfactory answer to the plaints of the antis, who unthinkingly condemn all hoardings because of the few that offend.
>
> I sometimes wonder if those who clamour so loudly for the abolition of the hoardings and outdoor advertising generally, ever pause to think what consequences their success would entail, if they realise how many of their fellow countrymen are earning their livelihood from the various trades which the hoarding makes work for, such as the paper maker, the ink manufacturer, the colour men, the printers, artists and designers, bill-posters, etc., not to mention those in the various agencies handling the appropriations, etc.
>
> At a time when every ounce of trade is of value to us, surely it is a disservice to the nation to do anything that tends to hamper its workers in the struggle to keep employed, and it is essential to face the fact that advertising is the very life-blood of business. Those who seek to interfere with its legitimate branches are surely doing their best to fling fathers of families on the unemployed scrap-heap and add a needless burden to the already pressing unemployment problem of the country."

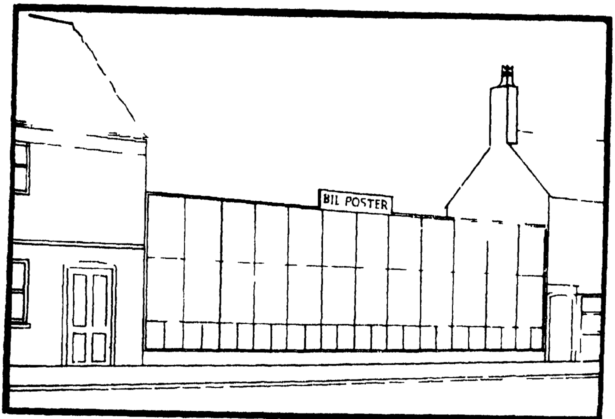
This sort of story we have all heard before, but no man has a right to injure his neighbour by his trade. Has this gentleman ever thought of the many, many firms who supply a great public and never do outdoor advertising ? I have watched the growth of some chocolate firms who never use outdoor advertising. They have, during the last ten years, developed a great shop trade by brains in selling and taste in packing and quality of goods.

The hoarding proprietor must remember he is not the only pebble on the beach.

No one objects to his posting around building operations. It is conceivable that vacant land and certain spaces and bare walls should be allotted in every large town where orderly advertising, with a limit to somewhere near the size of the



A hoarding on the Main Street, Loughborough.



The Loughborough hoarding set out in an orderly way, reducing size of posters to 60 [illegible] 40 with row of auction and public notice bills 30 [illegible] beneath.

advertisement as at Zurich would be regulated in such a way as to be really serviceable to the advertiser and not unpleasant to the general public He might well shed much of the vulgarity of his posters to the advantage of everyone, but he must be made to leave alone the facades of buildings, with very few exceptions, where an orderly space has been arranged by the architect Station fronts and bridges must be ruled out, that is, if we are to keep any pride in our cities

As an example of how some orderliness could be effected I give two sketches of hoardings, first a single row and a double row of 60 x 40 posters with a row of double crown 30 x 20 bills beneath The first, properly framed in, might be suitable

Typical example of orderly hoarding from Zurich Public opinion and advertising company's sense of fitness has reduced posters to 50″ × 34″

for small country towns on selected bare walls and would be about 8 ft. 6 ins. high, and the second, 14 ft high, would do for larger towns. Each example is an alternative to an actual hoarding.

This size poster (60 x 40) is quite large enough for any use, and what a difference it would make if our vacant spaces and bare walls were treated in this way. Auction bills, lectures, political meetings, etc., would be standardised to fit into definite spaces or could be half bills, 15 x 20, where less money can be spent. Each advertisement would stand a fair chance of being read and not killed by its neighbours.

I need hardly remind you that we have the Advertisements Regulations Acts of 1907 and 1925 and where these are adopted the County and Urban Councils can remove hoardings that offend the amenities. We owe these to the untiring efforts of one man, Mr. Richardson Evans, who founded the Scapa Society and carried it on with small funds and little support for many years. This Society has not perhaps been as aggressive as it might be, but thanks to its efforts the following have adopted the Acts.

	Number in England and Wales.	Number which have made Byelaws.	Per cent.
Councils of :—			
County Boroughs	83	13	15.6
Municipal Boroughs	255	40	15.7
Urban Districts with population over 10,000..	274	44	16.0
Counties..	62	56	90.3

But, alas, how few exercise them! The Scapa Society has been instrumental in getting them put into force and has removed a number of very aggressive signs in the South, but how few counties are doing their duty to the public.

The last year has shown a marked increase in removals and prosecutions, including Derbyshire, Merioneth, West Riding and Cheshire, all successful, so the future is in the public's own hands.

But public opinion is rising and we get protests from people like the Archbishop of Canterbury, Mr. MacDonald, Mr. Baldwin and others against the atrocities that defile our land. The success of a book like Mr. Williams-Ellis's "England and the Octopus" and the design and Industries Association's Cautionary Guide to St. Alban's, which sold out 5000 copies at once, is a sign of the times. And here can I thank the press generally for the help they have given to the Save the Countryside Exhibitions of the C.P.R.E. which have now visited between sixty and seventy towns, and I hope the Yorkshire press in particular will think better of their enamel sign campaign, which is so increasingly defiling the Yorkshire stone-built villages and moors.

What we really want is more order and gentlemanliness in our civilisation, and let me warn those of you who view with alarm the growing power of the masses that if you teach them disorder and chaos, if you disfigure your civilisation so that they can have no pride in it, what will be the results? You can already see it in the ordinary townsman's treatment of the countryside. The Dean of Manchester referred to this matter in his noble letter to the "Times" just before the last Countryside Conference. "We need something more than law. We need enlightened goodwill and real understanding of the issues involved. We need a wholehearted ambition among our English industrialists to emulate the best European practice and set a lead to tidying up and ennobling industrial surroundings."

Outdoor advertisement is only one way of selling goods and I often feel it is like the wasteful method of Nature where the cod lays two million eggs and two survive. One can hardly call it the maximum result with the minimum of waste.

I doubt if any one would admit that outdoor advertising is other than wasteful. A person posts say 1000 bills in the hope that say 100 of them are in effective positions and the price he pays is adjusted accordingly. If advertising cost a great deal more than it now does, it would be better handled and one remedy is therefore to make advertising dear. The restriction by public opinion and city control in Zurich, I have little doubt, is as much better for the advertiser as it is for the town. One simple course is to tax outdoor advertisement by size. The restriction of size also would demand order to make advertisements more effective.

I never feel that it takes the best type of brains to advertise, and its altruism as talked at advertisers' meetings savours of the Babbit type.

There is too much silly talk about helping British trade abroad as an excuse for home disfigurement, and I do not find firms refusing to advertise American goods or any others who care to pay for them. The advertising has now become a vested interest, and the main aim, of course, is to advise people to spend money in order that the agent may collect commissions. So long as they collect commission they do not seem to worry about the form and nature of the advertising. It has of course to be effective in some sense so that the person who pays the bills does not realise that 90 per cent. at least of it is waste.

Some of us as business men feel that the outdoor advertising trade really take themselves too seriously as regards the importance of their industry, and we are surprised how slow they have been to learn from such excellent examples as that of the Underground Railway, which is a standard of gentlemanliness, good taste and orderliness in advertising.

The outdoor advertiser has his place but entirely overvalues himself even in our very imperfect civilisation, and when all is said and done the real place for advertisements is the press.

If outdoor advertising can justify its place in this country it must cleanse its own nest, learn more taste, give up bludgeoning and use more brains.

It is comforting however to know that there is an end to all bad things, gentlemen, even enamel signs, and sometimes a real use for them to line cart bottoms. The carter says the bricks slide off beautifully.

DISCUSSION.

Mr. Frank Pick said that he was heartily in support of Mr. Peach and his movement for the control of advertising. There was no doubt that advertising could become a bad habit. Once it had been contracted it spread; it grew upon one, it got worse, and there was no hope unless one was able to inculcate, in the place of bad habits, good habits. From their own experience of bad habits all those present would know how difficult it was to eradicate a bad habit and to create a good one. That was the problem which had to be faced in connection with poster advertising.

In the middle ages the law was framed by the people who suffered from the troubles and injustices of life, and the law was the work of the people. There was a law with regard to nuisance ; if anybody did anything which was a nuisance to his neighbours, his neighbours had a perfect right to abate that nuisance, and so far as offensive smells and offensive noises were concerned the law remained in the same state to-day. If a man was creating a nuisance in these respects, one could stop him and interfere, but we did not seem to have arrived at a position when what offended the eye could be stopped. All that needed to be done was to develop the law of nuisance so that what offended the eye might be abated and removed too. He thought that would be better than regulations and things of that sort.

It would, of course, be of great help in connection with any abatement which might be undertaken if certain forms of advertising were definitely made illegal. The Westchester County of New York, where they were attempting to preserve some of the amenities of that very large metropolis, had certain parkways where nobody might erect an advertisement within a certain distance of the road. That, he thought, was an admirable provision. If anyone erected an advertisement within thirty yards of the road it was an illegal advertisement, and anyone could knock it down who cared to do so. Something of that sort was required in this country.

There was one other recommendation which might come in very handily. The point of view with regard to flyposting was that the person who committed the offence was the person who fly-posted the bill. The bill-poster could go round the village or the suburb in the early hours and stick the bills on the walls ; the bill-poster then disappeared, and he was the person who committed the offence ; but there was no doubt that the person whose bills appeared ought to be treated as an aider and abettor in the offence, and if anybody whose bill was placed by fly-posting could be fined there would be a cessation of fly-posting. He really thought that a little drastic action should be taken to do away with the tendency for advertising to creep into many places where it was not intended to be.

Mr. Peach had showed a slide of a square in Zurich with a statue of a man and a bull. He did not mention, however, that that statue was put up to the Burgomaster of Zurich, the man who had planned and built the modern town of Zurich in an orderly and proper way. In the Central European countries the Burgomaster corresponded to our Lord Mayor, but he was an official and was paid a salary to manage the town ; he generally did manage the town well, and he saw the results of his own exertions and efforts in the orderliness and decency in which the town developed, and at last he got a statue in the town square. All that orderliness and tidiness to which Mr. Peach had referred was attributable to that Burgomaster whose statue appeared in the public square.

Mr. George T. Mills (President, British Poster Advertising Association) said that neither he nor any of the members of his trade were going to yield to Mr. Peach in appreciation of the beautiful. His Association knew, as a trade, that they had been at fault in the past. It was now some twenty years since they had started to mend their ways. They had mended their ways to a very large degree, and they had done it by self-regulation. He wanted it to be known that the members of the British Poster Advertising Association had not the slightest desire to offend, or to destroy rural amenities. In plain English, it was not good business. If a poster stood where it should not stand, the governing body of the trade did all within its power, irrespective of whether legislation supported them, to have that hoarding removed ; but he must make it clear that although the Association, of which he had the privilege of being President, represented 98 per cent. of the total of the trade in this country ; they did not control the whole.

Another example of how the trade was self-regulating its affairs was that all the members of the London Poster Advertising Association had voluntarily undertaken not to build hoardings on any of the new arterial roads which had been built.

Mr. Peach had made a statement in his Paper which he (the speaker) wanted to nail down very hard. He read an extract from what he had termed a prominent journal of the bill-posters. That statement was unfair, and utterly inaccurate. The journal from which the statement was taken was a house organ, and was owned by a firm of advertising agents which never was associated with the poster advertising industry. The statement he had read was so obviously uninformed that it required no explanation. Mr. Peach himself had contributed an article to that particular newspaper. Need he say more ? The British Poster Advertising Association had no control over metal plates, or over any type of painted advertisement in this country. Its business was limited strictly to the showing of posters on hoardings and walls. The slides had shown one or two places where they should not be. He thought Mr. Peach would admit that in no case were those photographs taken less than eighteen months ago, and in all those instances matters had been much improved.

The lecturer had said that the advertiser, when he required an advertisement put up 1,000 posters in the hope that 100 would be seen. He had always found that the advertiser was an intelligent being. He would not pay for 1,000 if he were only going to get 100 exhibited.

He felt that the Council for the Preservation of Rural England would be wiser, instead of spreading their attacks as they did, to utilize their energies in forcing the County Councils and other local authorities to adopt the Advertising Regulations Acts. The 1907 Act and the 1925 Act could do all that was required. He thought that Mr. Peach's Society would be well advised to apply its efforts directly to ensure the exercise of those powers which every local authority could have. The Acts he had mentioned, and the Roads Improvement Act and the Town Planning Acts, gave Mr. Peach's Council all the powers they could desire.

MR. SHAW DESMOND said it was necessary to clear one's mind of cant in connection with the question of advertising. He was a novelist by profession, but he was going to take up a strictly business line. In his experience of the United States of America he had travelled in every State in the Union, and he had therefore come into contact with a great many advertisers and a great deal of advertising, and he had had recent experience in Germany, Italy, France, and Scandinavia, and so he felt he had a right to say a few words. At a recent International Congress of advertisers in New York he had spoken on advertising and art. He had asked a man at that Congress to stand up and name at once six advertisements on Broadway. On the spur of the moment he could only remember Wrigley's chewing gum. Going from Broadway to Piccadilly, nothing in the world could prevent the American advertisement from entering this country. One would never get to the basis of advertising until one realised that *les affaires sont les affaires*—business is business. He did not believe that anyone would ever be able to check advertising by merely passing virtuous resolutions or by using utopian language. He was utopian, but only in quite an abstract sense. The facts must be faced, and the facts were these. In order to sell goods to-day one had to advertise, and to advertise cumulatively. The cumulative advertisement was the successful advertisement. Mr. Peach would like to relegate advertising to the Press. He had some newspaper shares himself, and he believed that that was the best advertising in the world ; but, at the same time, advertising could not be kept to the columns of the newspapers. Writing on the sky had already come, and in Paris the other day he had seen a sky advertisement of the Citroen car. That was bound to go on. We were living in an age of democracy, and so far from the age of democracy leading to a beautiful type of advertising, he was quite convinced that it would do nothing of the kind. What it would lead to was a perfect standardisation carried to the *n*th degree. He thought that tendency was already to be seen.

How was this to be changed ? It could not be changed just by Act of Parliament. Acts of Parliament had proved in the past to be dead failures in a thousand directions. It could not be changed by pious generalisation. It could only be changed by that much disused thing—education, by giving the child an idea of the beautiful. That was a very slow way, but it was the only way.

MRS. B. H. DERRY said she had been very interested in the Paper, because the view from her house overlooking the estuary of the Exe had recently been spoilt by an ugly hoarding. She had written to a friend of hers on the local Council, and he had said that the Council had no power to interfere with the man's advertisement, which was on his own property. If anyone was interested she could produce the letter.

MR. J. H. WINGRAVE said that if the local Council to which the last speaker had referred had taken advantage of the powers which were in their hands under an Act which was 22 years old, they could immediately have secured the removal of the advertisement which injured the scenery.

Mr. N. Carrington said he was tempted to intervene in the debate because he had been associated to a certain extent with Mr. Peach in his campaign, and some statements had been made there which he thought needed a certain amount of illumination. It had been stated quite rightly by Mr. Mills that his Association were in sympathy with the movement, but he sometimes wondered whether there was sufficient co-operation between the Council for the Preservation of Rural England and the Poster Advertising Association. If they got together they could probably do something to remedy abuses without recourse to legislation. He doubted the efficacy of legislation. It was better to educate public opinion. He had asked the Shell-Mex Company in which he held shares to remove objectionable advertisements. They had done so, and he thought that shareholders could do a good deal in this way if they took the trouble. It was necessary to convince commercial firms that if they disfigured the roads they would find that they incurred prejudice instead of increasing their sales. That, to his mind, was the only possible remedy, and one that should be pursued with unflinching courage.

Mr. H. G. Griffin (Secretary, C.P.R.E.) said that his Council numbered amongst its constituent bodies many local authorities, and they were becoming very much alive to their responsibilities. The Surrey County Council had appointed a committee to deal with the question of advertising, and that committee had come to the conclusion that in certain areas the Acts required tightening up. As soon as this was done it would be seen that the local authorities would take very definite action. The Merioneth and Derby County Councils had already had successful prosecutions.

Mr. A. E. Goodwin (Director of the Federation of Master Printers) supported the remarks of Mr. Mills in expressing sympathy with the genuine desires of the Scapa Society or the Design and Industries Association to protect the amenities of the countryside. He felt that a good deal of care should be taken before any further legislative proposals were put forward. No purpose was served by indiscriminate opposition to outdoor advertising. Billposters and printers knew that the whole success of advertising by posters depended largely on the sympathy of the public, and in the opinion of those capable of judging, considerable improvement in the art of poster advertising had been made in recent years.

Mr. Alfred C. Bossom, F.R.I.B.A., said that ugly advertising had an effect on unemployment in England. About £5,000,000 was spent in England last year by American visitors, as against a sum of between £50,000,000 and £80,000,000 spent by American visitors to France, and it was only by maintaining a beautiful countryside that we could expect to attract Americans to come here and spend their money. He preferred consultation between the various interests concerned, both for and against, to the passing of further legislation.

Miss Helen Ward expressed the hope that the British Poster Advertising Association would endeavour to follow the example of the Underground Railways, which had acquired a positive reputation not only for unobjectionable but for really beautiful advertisements of a moderate size.

Mr. Edward Warren, F.R.I.B.A., said he had long advocated in this country, without success, the imposition of a stamp tax on advertisements similar to that obtaining in certain European countries. This would not only be of considerable help to the Revenue, but would tend to decrease the size of advertisements, for the stamp tax was graduated in accordance with the size of the advertisement. As a member of the Automobile Association he had written to that Association protesting against their ugly black letters on a brilliant yellow background. These were quite invisible at night, and the ugly colours were therefore not justified on safety-first principles.

Mr. A. Hannay (Chairman, Advertising Section, London Chamber of Commerce) said he had feared that the meeting would not end without a suggestion of further taxation. He did not understand why it was that, if poster advertising was so unpopular, the county counils and other local authorities had not exercised the powers of restraint vested in them by Act of Parliament. It probably meant that some people who were in advance of public sentiment were trying to impose their ideas on others. He thought a broader view should be taken, and as a user of poster advertising he did not apologise, because he had tried to comply with what he believed to be the public taste and sentiments of the day.

Mr. Sydney Walton, C.B.E., said he was with Mr. Peach entirely in his desire to preserve the beauty of England. He had been most courageous in his lecture.

Mr. Walton expressed the hope that there would be conference between the British Poster Advertising Association and Mr. Peach's society.

The Chairman, in moving a vote of thanks to the author, congratulated him on his courage and all the speakers on the admirable good temper they had displayed towards Mr. Peach in discussing a rather controversial subject.

As he understood it, no one present had any quarrel with advertising, even outdoor advertising, so long as it was decent. He understood from the lecturer that he was entirely in favour of outdoor advertising so long as it did not conflict with the major interests of the beauty of the countryside and the orderliness and decency of the towns.

He was satisfied that the enamel sign was the worst offender, and not the more or less orderly assemblage of posters on a hoarding. Unfortunately there was no association of enamel sign planters—a sort of scandalous trade that dared not put up its head in the daylight. The British Poster Advertising Association and its London society were bodies of highly respectable and responsible citizens who had held out the hand of friendship to the stalwarts of the C.P.R.E. movement, and had expressed their willingness to discuss the matter and to receive specific recommendations as to the removal of offensive posters. That was a great step forward. He did not think there was need to be unduly pessimistic. Mr. Shaw Desmond was very pessimistic, but then, Mr. Shaw Desmond was so eloquent that he would make one believe anything. The public was to be blamed for not sufficiently controlling its local authorities, and making them remove the more intolerable offences. He thought the Poster Advertising Association was quite willing to control their own unruly members if it was suggested to them in a reasonable way; but it was for the county councils to go after the road signs and the enamel signs, and when that had been done it would be time enough to go after the poster people, some of whom were not as noble as they might be, as Mr. Mills well knew.

He thought Mr. Bossom's suggestion was a very sound and economic one. If the countryside was polluted much more than it was at present, this country would suffer grave economic injury, because there was no doubt that American visitors were increasingly upset at the vulgarisation of the beauty spots they went to see.

The vote of thanks was carried unanimously.

Mr. Peach, in reply, thanked the meeting for their kind reception of his lecture.

EXHIBITIONS OF APPLIED ART

COOLINGS' GALLERY, BOND STREET. BROOK STREET GALLERY, BROOK STREET. The London Artists' Association are showing Christmas presents at their headquarters, Messrs. Coolings'. The senior members proved in Omega Workshop days that they could apply their talents most agreeably to decorative work of all kinds, and their hands have since then gained in cunning. The younger members are sometimes nearly as assured, in their touch, as their elders are. The lampshades shown are attractive, and not expensive ; the trays will delight those who care for this sort of thing—and a good honest sort of thing it is. The Duncan Grant chair which lords it over all the smaller fry is gorgeous. There are painted tiles, and boxes, and cushions ; the cushion by Douglas Davidson is charming.

Mr. and Mrs. Powell are exhibiting painted pottery at the Brook Street Gallery. When they follow in William Morris's footsteps their patterns are excellent ; their rather more representational designs are not, perhaps, quite stylised enough. The shape and quality of their wares are, however, uniformly good, and many a useful present could be chosen from among the coffee sets, ink-stands, mugs and jugs that they offer.

NOTES ON BOOKS

REPORTS ON THE PROGRESS OF APPLIED CHEMISTRY. Vol. XIII—1928. London Society of Chemical Industry. 12*s*. 6*d*. to Non-Members ; 7*s*. 6*d*. to Members.

The year 1928 was not marked, in most of the industries under review, by any outstanding instances of progress on the technical side. The general level of prosperity, however, was encouraging, and there were many signs that the chief chemical industries of the country were feeling their way back to better times. The first annual meeting of the great combination known as Imperial Chemical Industries, Ltd., was held during the year, and the report presented showed that the profits actually made had exceeded the figures previously estimated. Similar prosperity attended chemical industry abroad, notably in France, Germany and the United States.

In the absence of any very spectacular advances, some points of general interest may be extracted from the Reports. In the gas industry, much attention was directed to the proposal to establish " gas grids " supplying gas at high pressure to whole regions, rather on the lines of the electrical systems now under construction in this country. The scheme was furthest advanced in the Ruhr district ; but it is interesting to note that the considerations which make such a system of long-distance gas transmission desirable in Germany are not felt to apply with anything like the same force to many of the large centres of population in Great Britain.

Improvements in methods of domestic heating received a good deal of attention during the year, the main advances being in America, where the use of thermostatically regulated boilers, fired by oil or gas, increases rapidly. The cause of smoke abatement in this country was advanced by an important inquiry held at Bradford, by the Ministry of Health, into the form of a model by-law defining the permissible limits of smoke emitted by factory chimneys. Investigations were also carried on, mainly at Leeds, into carbon monoxide pollution of the atmosphere. This is apparently negligible at present in the open air, even in great cities ; but the work emphasized once again the necessity of the use of a flue with gas fires.

Low-temperature carbonisation continued to command public interest, and considerable activity occurred in the erection of plants in various situations—at collieries, gas-works and elsewhere. What was originally the primary aim—the production of smokeless fuel—is now to a great extent over-shadowed by a secondary objective, namely the profitable disposal of fine coal, which otherwise is something of a drug in the market. The heavy production of mineral oil has of recent years created difficulties for those developing processes of coal treatment, and the imposition by the British Government of an import duty on motor spirit was no doubt gratefully received in such quarters. The investigation of methods for producing liquid fuel by the hydrogenation of coal naturally felt an immediate stimulus, and some progress was made towards a satisfactory solution of the problem. Perhaps the most marked advances in relation to liquid fuels, however, were those associated with the use of lead tetraethyl as an " anti-knock " for internal combustion engines.

The steel industry had no great improvements to record, though much useful work was done, notably in the examination of problems related to corrosion—a subject which was prominent in non-ferrous metallurgy also. In glass technology, the chief advances concerned ultra-violet transmission and non-splintering properties. Rubber, from the economic point of view, suffered an experience the reverse of that of fuel-oil ; for the termination of the Stevenson restrictions tended to terminate also efforts to produce a satisfactory rubber-substitute. The production of artificial nitrogenous fertilisers showed further marked expansion, somewhat opposed in the United Kingdom, however, by the prevailing agricultural depression.

The beet-sugar output underwent a set-back in this country, probably owing to accidental conditions affecting the previous year's operations ; but one new factory was opened, and some progress was made towards solving the problem of utilising factories during the off-season. The world-production of cane sugar set up a new record in the history of the industry, the increase being mainly due to rapid advances made by Java, where a new cane was widely cultivated.

The volume, as in other years, presents an immense collection of material in the most convenient possible form, and both the editor and his contributors deserve the thanks of the chemical industry for the efficiency with which the various aspects of its progress are recorded.

GENERAL NOTE

INTERNATIONAL CONGRESS OF MINES, METALLURGY AND APPLIED GEOLOGY.—The Sixth meeting of the Congress, which will be held under the patronage of H.M. King Albert and organised by the Association of Engineers of the School of Liége, will take place from the 22nd to 28th June, 1930. in connection with the International Exhibition to be held at Liége. Further information in regard to the Congress may be obtained on application to the Secrétaire Général, L'Association des Ingénieurs de l'Ecole de Liége, 16 Quai des Etats-Unis, Liége.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

FRIDAY, DECEMBER 27..Empire Society, Hotel Victoria, Northumberland Avenue, W.C. 3 p.m. Rear-Admiral Gordon Campbell, " My Mystery Ships."

SATURDAY, DECEMBER 28..Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr. S. R. K. Glanville, " How Things were done in Ancient Egypt. Lecture I. The Elementary Use of Nature." (Juvenile Lecture.)

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NOTICES

WEST WYCOMBE

At the last meeting of the Executive Committee of the Fund for the Preservation of Ancient Cottages, it was considered advisable, in view of the large number of Christmas appeals, to defer a general issue of the Appeal for the West Wycombe Preservation Fund until the spring. The Secretary, however, will be glad to forward copies of the booklet to Fellows of the Society who are interested in the movement.

After Christmas restorative work in the village will have started, and, thanks to the generosity of Lady Binning, who takes a keen interest in this experiment in educative control, the Society will have a building in the village where all information as to the work and its financial requirements can be obtained. This interesting little house is to be equipped and furnished in character with the ideals of the Society.

The Local Authorities have now agreed to bring the necessary services and the drains through the village, and this will enable the Society to sign an agreement with the Trustees of the Douglas Haig Memorial Homes for the restoration of a considerable block of derelict cottages at one end of the village. Negotiations are proceeding with the Staines Brewery in connection with the hotels and inns, with a view to their reconditioning. The Society's Agent is also dealing with the two chair factories, which are two very living assets in the village.

WILLIAM SHENSTONE'S HOUSE, THE LEASOWES

The plea which was put forward at a recent meeting of the Society for this interesting eighteenth century house has received authoritative support Apart from the correspondence that has been going on in Birmingham in this connection, important contributions have appeared in the November number of *Blackwood's* from Mr. Charles Whibley, from Mr. J. B. Firth in the *Daily Telegraph* on December 9th, and from Mr. Christopher Hussey, entitled "Company at The Leasowes," in *Country Life*. We quote from the last mentioned :—" Yet the City of Birmingham, proud of the cataracts of ugliness that have flowed over the world from its factories, still ignores the meadows on its fringe where the seeds of so much beauty were also raised. For the cost of a few tramcars the little property could be bought, its woodlands be opened as a public park, and belated gratitude paid to a son of Birmingham who gave his countrymen eyes with which to see the loveliness of the world around them—such, indeed, as remain."

OUTDOOR ADVERTISING

Mr. H. H. Peach's paper, published in the *Journal* last week, has attracted considerable notice in the general press. How long are our towns and villages to suffer from the garish untidiness of modern advertising? Mr. Peach has done more than anyone else to draw attention to the growing evil. Why should a decent architectural building be at the mercy of the advertiser? Mr. Frank Pick, who spoke at the meeting, has shown how advertising can be an art when it is under proper control.

PROCEEDINGS OF THE SOCIETY

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SIXTH ORDINARY MEETING

WEDNESDAY, DECEMBER 11TH, 1929

MR. JOHN MAUGHFLING, C.A., in the Chair

THE CHAIRMAN, in introducing the lecturer, said that Major Wheeler had spent a great many years in the service of the General Post Office. He was responsible for the introduction in the G.P.O. services of the first bicycle and the first motor vehicle. He was technically responsible for building up perhaps the largest fleet of vehicles in the country. When he retired, the service comprised 20,000 bicycles and 3,000 motor vehicles. Outside his official work, Major Wheeler had always taken great interest in the technical and commercial side of the motor industry and motor transport. He was for six years a Vice-President of the Institution of Automobile Engineers, and he also did good work in bringing to a conclusion the Report on Automobile Nomenclature for the British Engineering Standards Association. His premature retirement, due to ill-health, was particularly hard on a man like Major Wheeler, who was so keenly interested in his job.

The following paper was then read:—

OVERHEADS AND OTHER FACTORS INFLUENCING ROAD TRANSPORT COSTS

By MAJOR C. WHEELER, O.B.E. (Mil.), M.I.A.E.,

Late Chief Autcmobile Engineer, General Post Office.

"Everything can always be done better than it is being done." *Henry Ford.*

It is customary when reading a Paper before such a Society as this for the author to be more or less an authority on his subject, and whilst I cannot claim special distinction as an accounting expert, nevertheless I believe I have a certain measure of practical knowledge which warrants my bringing the subject under review. Whenever I quote, as often I do, from some other writer, it is not for dearth of opinion of my own, but rather that my belief may be fortified by opinions which have already been accepted as authoritative.

Some folk have had the experience, fortunate or otherwise, at one time or another of being associated with an undertaking, in connection with which a Committee of dissatisfied shareholders has been appointed to inquire into "who, the why, the what."

It is probably within the memory of many that as recently as 1922 the Board of Directors of the British Empire, under the pressure of shareholders' opinion, appointed such a Committee of Inquiry, to investigate the expenditure of various Government Departments, which Inquisition, popularly known as the "Geddes Axe Committee," in due course made a searching exploration of the costing system of the Transport Section, managed by myself, and commercial magnates of the calibre of Sir Eric Geddes and Sir George Beharrel reported that "having examined the checks employed on the running of these vehicles, we find that adequate allowance is made for depreciation, interest on capital and other overhead charges . . . has effected substantial economies, etc."

I am inclined to the view that the progenitors of the original Post Office were intimately connected with one of the Lost Tribes of Isreal, if indeed they were not the real McKay, so deeply ingrained in the constitution of the present-day organisation is the fetish "vill it pay ?" Strong financial justification has to be made with every fresh field of operation in motor transport mooted.

It will thus be seen that in building up and organising the largest fleet of stores vans in the country, running some twenty-five million road miles per annum, and under the conditions already remarked, I have graduated in an economic school second only in status to Aberdeen.

The phenomenon of a State Department being able to run a motor transport service with profitable results is not without interest at a moment when the question of unification of control of London transport under State authority looms so much in the public eye, especially when it is remembered that the responsible engineering personnel had no attraction in the shape of stimulating bonuses and commissions, which give colour to commercial life.

In considering the question of Overheads the subject resolves itself broadly into two groups:—

I. those items over which we have little or no control.
II. those items which will repay one if given consideration or thought, but which rarely receive such purely from the economic point of view, as, for example, administration or management.

The subject being a very wide one, and impossible to cover adequately in a single paper, I have necessarily limited myself to dealing with a few of its aspects from an engineer's viewpoint.

When I settled upon the subject of "Overheads" for my Paper and added the term "and other factors, etc.," I did not envisage the encyclopaedic nature of the complement until I had roughed out a draft exploring the main sections, which preluded voyages of an intricate sequence. The ramifications seemed to be as heterogeneous as the contents of the witches' cauldron in Macbeth. One of the chief difficulties was the selection of factors for discussion. A criterion had to be established, as it was obviously impossible, while confining the Paper to convenient limits, to include everything that would be of interest to all, and yet that which might appear most desirable to some, might be esteemed valueless by others. Eventually, as the result of much cogitation, I decided to cut the Gordian knot by boldly wielding the sword of my own fancy—only that which seemed of special interest to myself should be included; the method adopted of discussing the various factors is selective rather than comprehensive.

Many of the views put forward may probably have been expressed before, but reaffirmation often serves a useful purpose.

Support for ventilating the question might be urged by virtue of the fact that so many politico-industrial magnates are still insensible of the fundamental verity that almost every transaction in trade involves the movement of goods, and this ignorance, mark you, is in a country in which trade and carrying have been its main pillars of commercial prosperity.

The road transport operator has two distinct classes of work under his control: (1) passenger, and (2) stores, goods, merchandise, luggage, parcels, or freight, to which it is proposed to give the comprehensive title of "stores." Passenger work has certain difficulties peculiar to itself, but as I have had no special experience of this class of work, I will confine my remarks to the transport of stores. The work of transporting stores has three main divisions, namely: charging, transmitting, discharging. It will at once be seen that the Stores Operator, compared with the Passenger Operator, has two extra divisions, as the living freight does its own charging and discharging, the passengers providing gratis the energy to carry out the work.

Industry is not unlike a table with four legs: *labour*, *capital*, *invention* and *management* — each leg contributing towards the stability of the table top, "Industry." If any one leg be weak or missing, so will the top suffer in proportion. No significance must be attached to the order in which the four legs are named; one may commence at any corner of the table—they are all essential components if stability and usefulness are desired, though two of them (*invention* and *management*) have not hitherto had that measure of consideration their importance warrants.

Whether a man works with his hands or his brain, if he produces or causes to be produced more than his essential needs the excess is wealth convertible into capital.

I am just a little tired of hearing about the iniquities, rights and dignity of two of the aforementioned table legs, *capital* and *labour*. How about the other two? Strictly speaking, perhaps *Invention* and *Management* should be grouped under *Labour*, but as the latter has become so generally associated with the manual worker only, it is as well to throw a little light upon the other two important supports of Industry.

Back of the motors humming,
Back of the belts that sing,
Back of the hammers drumming,
Back of the cranes that swing,

There is an eye which scans them,
Watching through stress and strain,
There is the Mind which plans them,
Back of the Brawn, the Brain.

Berton Braley.

To vary the simile and to make it more apposite to this gathering, we might say: Industry is like an automobile, with the four road wheels—each of which must do its share in supporting the structure—represented by capital and labour, invention and management; the two former fitted on the rear axle, composing the driving constituent, and the two latter fitted on the front axle, forming the steering couple; in the front wheels we find, or ought to find, as important spokes, science, gumption and wise judgment. In the driving wheels essential spokes are spontaneity, proficiency or skill, resolution or energy.

If the metaphor be accepted in the above form, it will readily be seen that, as is actually the case, capital and labour, invention and management, are necessarily close allies, and the claim of labour to the full result of production, which is rendered possible only by the joint effort of all, is quite unjustified, and there is but little doubt that extravagant claims, by other of the factors, are similarly unwarranted. But let us direct attention upon Management, not however at the moment. It was the spoor of the game I was hoping to track, but my observations upon Scientific Management have, among other matters, had to be jettisoned, for want of time and space.

COST ACCOUNTING.

If accurate costing be important to an undertaking running a number of vehicles, it is doubly important to the One-Man or One-Truck Concern, as, if the latter unknowingly be working at a loss, it results in his quickly going under, whereas there is the possibility in the larger Concern of making on the swings what it loses on the roundabouts.

While the claim is not made that a costing-system will save one from failure, it is urged that a man who knows where he stands day by day is very much less likely to make a failure of his business than one directing his concern by guess-work. Upon my observing to a friend that many post-war owner-driver war lorries were run at uneconomical rates, due to ignorance of such a thing as "overheads," my friend replied, "Well! where ignorance is bliss." But to this I must take rigorous exception; as a fact I know of one case only in which "ignorance was bliss," and that was when a girl was very anxious to have the number 27 allotted to her in a sweepstake. This turning out to be the winning number, her friends naturally inquired why she thought it would win the first prize; she explained that she had dreamt of the number 7 three nights running and that three times 7 being 27 she thought that number was sure to win.

To urge the advantages of good cost accounting in an assembly of this character would be a work of supererogation, but it may not be without profit to ask and try to answer the question: Why a costing system?

In some businesses a costing system is desired in order that the selling price of the commodity may be determined or, alternatively, a price having already been fixed, to ascertain the cost, to enable an improved organisation to effect a reduction in the price.

It is highly probable that when costing systems were first introduced into business their object was to enable the producer to fix his price, based on the ascertained cost of production (as opposed to the wicked old method of fixing a price at whatever "the consumer or user would stand"), but the *raison d'etre* of a costing system has long since passed beyond this point. Costing knowledge is increasingly necessary now that the margin between production costs and realised prices is so much finer than hitherto.

Since a motor transport business is run for less than alternative service it follows that saving or profit is dependent on the knowledge of cost but, *worse* than no figures at all, are incorrect ones, for without knowledge of costs, ordinary caution would enforce a conservative attitude.

Now, what is cost accounting?

The answer would appear to be this: Cost accounting as practised nowadays is a systematic method of computing expenditure right on the heels of the causative agents which originate the expense, each factor of work and its influence being segregated and scientifically analysed to its exhaustive serviceable point.

The individual or concern that regards accounting as merely a recording function is blind to one of its most salient properties, for it actually provides the Operating Manager with a priceless tool for *control* of his affairs.

While the practical benefits are probably obvious to all, it may not be considered presumptuous to point out that there is an ethical side to the case, which, whilst not so apparent, is nevertheless of appreciable importance, for, by eliminating guesswork in tendering, and substituting accurate estimates, a Business Head is able not only to " play fair " with his competitors and his creditors, but also to give a " square deal," if so disposed, to his " co-partners " (*i.e.*, his employees) in production. For, as the great Bacon observed, "A man is but what he knoweth."

Whilst accounting is fundamentally associated with recording the history of transactions, it will have been compiled, if carried out in an efficient manner, in such a convenient way as to furnish the basis for constructing much else therefrom.

Heed should be given to one most important point, namely, that the labour involved in allocating expense in any system is not too costly. That is a circumstance which the Head of the Concern must himself determine, or depute an assistant, possessed of an efficient logical equipment, to watch carefully.

Incidentally, and purely as a matter of interest and, it is hoped, excusable self-conceit, the fact might be mentioned that the costing system as devised for a dozen automobiles, which I briefly outlined in 1909,* has been appropriately expanded and adapted, and now does duty for many times that number of vehicles.

It may also be of interest to those engaged in ancillary transportation if I explain the method of ascertaining the savings effected by the fleet of Stores vehicles over which I had control. There are certain men in the Stores Depot, under the control of another entirely independent officer, whose special duty it is to determine the most economical form of transport for all consignments being despatched and to co-ordinate demands upon the fleet. These men are expert on all questions of freight, whether railway, canal, hired transport, or depot transport. They are in no way interested with the development of the official Motor Service, being concerned only with the economical and expeditious despatch of stores. They have absolutely nothing to do with costs or maintenance of vehicles, except to be informed of the " all-in " costs of certain types of official vehicles.

For a period of one month per annum these men are asked to keep a careful record of all consignments sent by official vehicles, and to cost them at the *cheapest alternative means*, whether rail, sea, canal, or hired motors. This cost is multiplied by twelve, and then compared with the " all-in " cost of the official fleet for a year. Obviously it would not do to multiply by twelve the " all-in " cost of the official fleet for the corresponding month, otherwise one might be open to the charge of postponing heavy repairs with a view to reducing costs and thus securing a favourable, but unfair, comparison.

To resume, any system adopted must not be so complicated that several highly-paid clerks are required to operate it. In other words, the organisation must not be " top-heavy." An important factor in its successful operation is the disposition of the clerks engaged thereon ; no effort should be spared to ensure that cheerful support and full understanding of its working is secured from the operator's point of view; it pays to show each new employee something beyond the mere routine working of his or her particular patch, otherwise after the moving spirit of the Installer has departed to fresh pastures, the system, however good in its inception, may languish and finally succumb.

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* Proc. I.A.E. Vol. 4. pp. 266, *et seq.*

I hold a somewhat unorthodox opinion on the injunction for punctilious accuracy in our everyday life, and as an expression of this view has occasionally shocked my accounting friends, perhaps a few moments consideration of the subject may be profitable, especially seeing that the general tenor of this Paper is to emphasise the necessity for ascertaining true facts as the *modus operandi* for securing economy in transport costs.

We are told in the Holy Writ: " To everything there is a season and a time to every purpose . . . . a time to weep, and a time to laugh "; with all due reverence, I would add: There is a time for *absolute accuracy*, and a time for mere approximation; and in support of the latter tenet I submit for consideration two concrete illustrations, wherein pedantic accuracy is farcical.

I remember well in my early days—my very early days, for, like Mark Twain, I was born young—how much I was impressed by the fact that Mount Everest was 29,002 feet high. The unit feet has remained fixed in my memory to this day.

To come nearer home. In a certain newspaper recently the horsepower of an aero-engine was given as 627.5. One does not need to be an automobile engineer to appreciate that in ascertaining the indicated horse-power of an engine—even if carried out by a demonstrator at the National Physical Laboratory—there may inevitably be a small margin of error, one way or the other, in the calculation and measurements. If this error is, say, only 3 per cent., then it would not be incorrect to say that the horse power of the aero-engine in question was either 600 or 650. By stating the horse-power as 627.5, the impression is given that the figures have an exact meaning, which is, of course, contrary to fact. Similarly, the "measuring Johnny " of Mount Everest might have left out the extra two feet without giving offence to the Fellows of the Royal Geographical Society. This class of error is not confined to newspaper articles, but persons who should know better have been guilty of similar dope in technical journals. It was my good fortune some thirty years since to attend a series of lectures by Professor Perry on " Practical Mathematics," and probably some will detect the influence in the examples quoted.

It will be observed that in drafting the Main Expense Schedule I had in mind the I.C. engine only, and that whilst the majority of the items are applicable to steam and electric vehicles, it may be necessary in the case of such types to add items peculiar to them, *e.g.*, water and accumulators, respectively.

A Transport Superintendent is a queer conglomeration; in addition to the actual administration of the technical side of his business he is obliged to keep pace with the rapid progress of Science in Industry, to be an amalgam of engineer, chemist, lawyer, cost-accountant and psychologist, learning to take labour by the hand and not by the throat; he must have a working knowledge of all the great provinces of transport thus far explored, original competence in some of the main fields, and the capacity to co-ordinate the laws of the whole in a reasoned scheme; and as a buyer to purchase one thing only—miles—not fuel or tyres—but tyre-miles and m.p.g., and withal, he must be an incorrigible optimist.

Transport organisations vary so much, not only in the character of their work, but also in regard to topographical conditions, that, without a complete grasp or understanding of these variable factors, the mere presentation of cost figures has but a limited value. Even in the same class of business, say the carrying of mails, extreme care has to be exercised when attempting to make comparisons.

Maintenance costs of identical vehicles continuously running on cobbled roads *v.* good macadamised roads; hilly country, like Amersham and Chesham *v.* a flat district like Bedford; or, again, if operated in a sparsely-populated quarter as against a district with numerous traffic stops, and so on. Many other indeterminable factors could be mentioned, each of which, in varying degrees, strongly influences the operating costs, but cannot be brought to account by figures. One other important feature, liable to be overlooked, is the percentage of day to night running, and yet another variable in some organisations, the number of drivers per van.

It is for such reasons that comparisons between one organisation and another particular organisation carry little weight. But that does not mean that no use can be made of somebody else's figures. It is useful to compare average figures of the whole concern with average figures of several other concerns, if the latter be grouped together. Comparisons often reveal where leakages are occurring and investigation of the significant items is then called for.

The system upon which I worked was this: The recorded costs of any one vehicle were always compared with the *average* of all vehicles of that particular type, and when a marked difference one way or the other was disclosed, the matter called for investigation, and then were usually brought to light certain adverse or favourable factors of the character referred to. Now the point it is desired to drive home is this: If striking variables exist in your own organisation, how is it possible to determine with a real degree of usefulness how your figures compare with another's?

Where cost comparison can repay one handsomely is in this respect, and it was a feature of my late business (not the Mail side, but ordinary Stores transport comparable with other Stores transport services).

The possibility of a cheaper alternative is considered in each case before a consignment is sent by Departmental Van and, further, a comparison is made at certain intervals between the cost of the vans and the cost of performing by the cheapest available means all the services performed by the vans during one month as already explained.

To sum up the question of comparing cost schedules, I might mention that I prepared, some few years since, to act as a guide, a large and complete schedule, showing running costs and standing charges for various types of vehicles, but the Schedule bore this significant remark in leaded type: "Whilst the table gives figures, the result of many years' investigation of the problems, as the recorded costs of many million miles' work, yet, taken singly and applied without full knowledge or due recognition of individual conditions, such facts and figures, accurate in themselves, are liable to mislead."

While it is true that the characteristics of transport organisations differ very much both as regards the varying nature of the work and in respect of their constitution, the necessity for including a complete schedule of overheads in a costing system must be accepted as an axiom in any transport undertaking, no matter of what magnitude. Size is largely a matter of the multiplication table. It is also probably axiomatic to state that when a Transport Controller sits down to examine his records the outstanding feature in his mind is: how do the expenses compare with business done? I do not claim to have made any discovery in the tabulated statement submitted, but believe that a correlation in the form of a Table of *all* the components in a complete costing system will be of service, if only for purposes of reference; it is tendered more in the nature of a blue print than an oil painting.

It must not of course be forgotten that the human element plays no inconsiderable part in any organisation, and bearing this in mind the system should be so devised that it does not depend solely upon any one individual for its smooth running. Always remember the cemetery holds many men who thought their business concerns could not get along without them.

Expenditure may be broadly grouped under Running Costs, Standing Charges, and Overhead Expenses, and whilst it is possible opinion may differ as to whether such and such an item should not come under the Charge Column instead of the Expense Column, it is submitted the point is not of material consequence, the transcendent factor being its appearance *somewhere*.

Having indicated the primary object of drafting the Main Expense Schedule, I will endeavour in the space at my disposal to suggest a few significant features which influence the magnitude of some of the components, and trust that the discussion will bring out certain aspects of the question entirely omitted or too briefly touched upon.

It may be desirable at the outset to indicate what we mean by economy. I remember an observation made many years since by Henry Ford in the pages of the *Dearborn Independent* on the subject of economy, mainly, if memory can be trusted, concerning government. I have forgotten the actual words, but the tenor of his remarks was: "Economy has frequently little to do with the amount of money being spent, but with the wisdom of spending it."

Support for this submission is given by Burke, who observed: "Expense, and great expense, may be an essential part in true economy."

Expenditure divides itself into three main groups:

1. Materials.
2. Labour.
3. Other units of utility which are not associable obviously and precisely with any characteristic element.

It may be of interest to state that:

(*a*) Direct wages (drivers and mates) absorb practically 50% of the total all-in costs of a road transport undertaking. (*The Commercial Motor* Tables of Operating Costs corroborate this percentage).

(*b*) Fuel costs are 33% of running costs and 11% of all-in costs.

(*c*) Lubrication: the importance of this factor cannot be measured by the significance of the sum in the total expenses.

(a) It will thus be seen that the wage question is really of paramount importance. This does not of course imply that to secure lower costs, cuts in wages should be made. The management which leads off with this expedient discloses poverty of thought, and at once confesses its inability *to manage*. Attention is directed to the point solely to emphasise the necessity for the management giving close attention to the specific condition of seeing that the workmen and staff are giving " value for money," and that they realise they are rowing in the same boat as himself, although possibly, to quote an old tag, with somewhat different sculls.

The need for psychological study of the employee, as a factor in securing low costs in conjunction with satisfactory working conditions, is at last being grasped by those in authority, and is particularly desirable in the case of foremen; not infrequently the best foremen are found among the men themselves, and their selection warrants special care, as good results in some shops are directly traceable to the kind of man employed in a supervising capacity.

(*b*) Some remarks on the fuel question are made later on p. 183.

(*c*) Time does not permit me to expatiate on the important part lubrication plays in keeping down running costs. I have referred to the question of quality of oils on page 184, and will therefore content myself at the moment with observing ' Take greater pains to ensure that the lubricant gets there, rather than devote your time to the quality of the stuff," but the point I wish to emphasise at this juncture is the need for special heed being given to the exclusion of dirt and foreign matter generally from all bearings. Observe carefully all covers, and those parts immediately adjacent to the filling orifices, and—another important condition—see that the bung-hole and neighbouring parts of oil drums are kept scrupulously clean, as also the smaller vessels for filling oil tins and the like. Oil containers with properly fitted taps should, however, be recognised as necessaries by even the smallest concern, their cost being viewed in the light of an insurance premium, whilst the recently marketed oil-distributing apparatus mounted on rubber-tyred wheels to facilitate movement over uneven ground, is to be commended to large businesses, as, by such a system, not only is the oil supplied measured off and accurately recorded, delivered under pressure through a flexible pipe, thus saving time, but it is also passed through a straining filter. The use of such apparatus should considerably simplify the somewhat unpleasant task of emptying and replenishing the oil supply in engine sumps.

At the head of this Paper I have quoted a remark by Henry Ford, which I consider to be as profound a truth as anything in the sacred gospels. Indeed

I regard Henry Ford as the Messiah of Modern Industry. Some may think my enthusiasm has run away with my judgment, but my admiration for Henry Ford is shared by John D. Rockefeller, who called the Ford Motor Co. "the industrial wonder of the world." If after reflection one agrees with the observation quoted, which is not a caprice of speculative ingenuity, but a rigorously deduced conclusion, then it is equally true to say that your present business, whatever it may be, and as a practical corollary, your net profits, are lower than they ought to be. Is it not fairly certain that one or two sections of your organisation are not run on the most creditable lines?

With the Main Expense Schedule in front of the General Manager and Operating Engineer, exactly what is the problem to be tackled? Obviously the object is to bring about a reduction of costs, costs in this sense embracing all charges and expenses. Let us endeavour to tabulate in a concise form the proposition:

To reduce Running Costs by lowering
- (*a*) fuel consumption and fuel and oil prices;
- (*b*) the cost of man-hours on maintenance repairs;
- (*c*) establishment charges; by elimination of unnecessary procedure and simplification of managerial methods; by reduction or by being *deferred*.

As already observed, it is a platitude to state that Running Costs will vary appreciably through physical (topographical) factors (state of roads, surfaces, gradients, etc.) beyond the control of the Operator, but it is an element not infrequently overlooked, or at least underestimated, when making motor transport contracts, or endeavouring to secure comparable results with another service.

It does not require long experience for the Operating Engineer to realise the fact that the principal item of expense in Road Transport in which he can "have a say," to put it colloquially, is maintenance. Low initial cost of the vehicle may quickly fade into the background.

Professor J. S. Haldane, in dealing with the complex biological subject of organism and life, points out that "machines do not maintain themselves; they do not mend themselves; they do not reproduce themselves;" but, as was lately observed by Major Beaumont in his recent paper "Some Aspects of Road Transport," read at the Institute of Transport Congress at Harrogate in May of this year: "There are instances of owners who have operated first-class vehicles at the rate of 1,500 miles a week, with little or no service attention, and have complained of the wear and tear after 25,000 to 30,000 miles and before repairs have actually been required." They believed, if they thought at all, that machines could maintain or mend themselves.

In considering maintenance we come to the enormously comprehensive subject of vehicle design—much too large a question to discourse upon within limits of this Paper, except to draw attention to a feature having an important bearing on maintenance cost, namely, accessibility of parts, by which is meant facility for effecting adjustment [illegible] the road, and for carrying out replacements and repairs in the workshop. In connection with the latter be it observed that labour is too expensive to be wasted unnecessarily and, moreover, it involves that peculiarly insidious but most important expense, vehicle lost time; for it should be remembered that a lorry standing in the repair shop involves at least two charges: one, the repair bill itself; two, capital standing idle; and possibly a third, contingent losses of work and labour being held up for transport of materials; or substitution.

Another important feature is design and materials in relation to the specific suitability of vehicles for the particular work upon which they are employed. Speed, supervision, and lubrication by drivers, are all matters which have an important bearing on the behaviour of vehicles, reflected in running costs, and consequently need more than casual attention from the Operating Chief.

One self-evident fact might perhaps be mentioned in connection with maintenance economy: standardisation of the vehicle fleet to one make (possibly various sizes of one make, and from a maintenance viewpoint I favour the idea of engines and gear-boxes as separate units) generally means carrying a smaller stock of replacement parts, with consequent saving in store-room, store-keeping and sunk capital.

Maintenance charges are, as a rule, largely made up of labour costs due to carrying out a repair in an old-fashioned way. A good quality portable tyre inflator is as essential as the provision of the best apparatus for speedily effecting tyre changing. With the advent of giant pneumatics attention in this direction is even of greater importance than hitherto. Portable fitters' benches mean much saving of time of men running about for tools and small consumable stores.

As stated a few paragraphs above, *working days lost* is a phase which should be specially stressed. Fuel, oil, and wages are readily recorded, but such is not usually the case with an equally important, yet more subtle expense—lost time. A vehicle standing in the repair shop will, as already observed, generally represent a far heavier charge than the actual cost of repair.

Maintenance costs can be substantially reduced if the mechanics in the Repair Shop are conscientious workers, and *exercise special care in reassembling units after repair*. Tightening up combustion heads, or covers secured by a number of bolts or studs, are examples where carelessness comes home to the management sooner or later; undue strain, which may have been placed upon such parts, ultimately causing a fracture, for which the manufacturer or designer, or both, may be blamed.

It is very helpful in this connection to cultivate a decent feeling with the men, occasionally mentioning such failures as having occurred to somebody else through ignorance on the part of that somebody's mechanic—thus instilling a sense of "pride in work" in your own employee—a real and great force, comparable with the team spirit in football or cricket, or *esprit de corps* in a regiment.

The creation of an atmosphere of intelligent service cannot of course be achieved by *instructions* from the Chief; a late colleague of the author tersely expressed the principle in these words: "The proper spirit can only be caught—it cannot be taught."

In the matter of keeping records special care is necessary to keep only such which have real practical value as distinct from those that are merely interesting, and that in as economical a manner as is possible. It is easy to keep many records which provide no really useful information and which do not justify the time and work expended on them.

Although Henry Ford on a memorable occasion, when he was confronted with a financial problem in 1920, came down with a heavy hand on certain masses of statistics it should not be inferred that he does not keep statistical records, nor that they can be eliminated from a well-managed concern.

While the keeping of records, *i.e.*, the accumulation of significant data, is in some degree akin to the keeping of accounts, it is nevertheless distinct. Accounts will show what has been accomplished from the financial point of view, but records will enable valuable comparison to be made between various vehicles, drivers and services, and indicate a useful line of action for the purpose of checking leakages. Figures, *qua* figures, are of little value; intelligent interpretation is called for to discern their intrinsic value.

To give help in the direction indicated it is suggested that consideration be given to the employment of graphic charts, of which I have made extensive use, both in civil and military spheres. Considerations of space have, however, compelled me to eliminate completely from this Paper the notes which I had prepared on the subject.

The Controllers of large Transport Organisations, having numerous branches or depots in various parts of the country find it increasingly difficult to maintain touch with the activities of ever-expanding departments, and to such the institution of a Graphic Chart Section to provide a ready visualisation of affairs (and blue prints made from the original chart may usefully be employed for general circularisation and comparison) is almost a *sine qua non*. But only in a slightly less degree should the Smaller Organisation regard Graphic Charts as matters of necessity.

PRINTED FORMS.

Public Departments (State and Municipal) are frequently scoffed at because of their apparent love of forms, with innumerable ruled-off spaces for the insertion of information. Probably many still have unpleasant recollections of "nil returns must be submitted." I have had sufficient experience to appreciate the value of specific blank spaces in forms and record returns. If one desires to ascertain definite information by correspondence from another party the sure way to obtain that information is to provide a blank space which "hits him in the eye" until he has spilled some ink giving attention to the detail. Take, for example, a driver's log sheet; if definite spaces were not provided thereon for recording miles, fuel and oil, and so on, it is quite certain that one or another would be frequently omitted. There is also in motor transport management a psychological view-point in the filling up of forms; drivers are not as a rule "scholards" enough to like the job, and wherever possible they will shun the task; so keen is their desire to escape writing up a report in the daily log that some will take especial care to avoid a breakdown occurring. This is an aspect that has probably not occurred to many. If anyone knows a better method of obtaining information from one or many different sources than by means of spaced and ruled forms I would be glad to hear about it. Reference to the income-tax forms is perhaps too painful to many, but there is little doubt that Somerset House folk know their business well.

OVERHEADS.

There is an ancient Egyptian Compendium, now in the British Museum, which announces in its title, with much highfalutin' embroidery, that it gives information on the whole range of divine and human knowledge to the ignorant and learned alike. Apparently the subject of " overheads " is neither divine or human, for I failed to find any dissertation upon the question under discussion. The terrible thing about overheads is that it is difficult to live with them, and impossible to live without them.

I have been at some pains to find in standard works a really comprehensive definition of the term " Overheads," but without success, and whilst in this gathering there is not likely to be any misapprehension of its meaning, it may be useful to propound a terse definition of the term.

" Overhead expenses " include every chargeable component, other than wages and materials, employed in the functioning of a business.

Owner-driver concerns invariably take a rose-coloured view of the revenue possible, with corresponding under-estimation of the outgoings. But one-man concerns are not alone in their ignorance of the factor, for when I had business dealings with certain firms in the Midlands in the " early nineties " I ran up against some quaint ideas of overhead costs, which can best be expressed without exaggeration on these lines :

Myself : What can you make me two of these for ?

Manufacturer : Well now, let me see ! Four hours man's time, say 5s. ; material, say 5s. ; that's 10s. ; add a bob for profit. Price 11s.

Observe the simple costing system ! No fooling about with on-costs and percentages for this and that !

Result : Order placed by me. By the way, this firm is no longer in business.

To emphasise the nature or actuality of the constituent " Overhead and fixed charges generally," I beg leave to digress for a moment to show how an automobile, or any other article of commerce, may be sold at less than *ordinary cost* of production and yet be the means of realising a profit for the manufacturer.

One has no need to delve into Higher Mathematics to demonstrate the effect of fixed (overhead) charges on the cost of production. The following simple example clearly shows their effect, but it is necessary to observe that scientific costing is essential before increased output and lower selling prices can be ventured upon. Incidentally, this example may throw a little light upon the much advertised procedure of our American competitors.

Original output: 500 cars per annum.

Wages and material	£30,000
Fixed charges	30,000
500)	60,000
	£120 each

Output increased to 600 cars per annum

Wages and material	£36,000
Fixed charges	30,000
600)	66,000
	£110 each

Thus by increasing the output by 100 cars the cost of the original number is reduced by £10 each, giving the manufacturer an increased profit of £5,000.

If, therefore, he chooses to dispose of the increased production of 100 cars as demonstration models to selected agents at £95 each, he makes a loss on them of 100 x 15 : £1,500. *But* he would have an increased profit of £3,500 on his total business.

It may be urged that the example cited deals only with production units, but the Road Transport Operator who is producing and selling "Road Miles," can adapt the principle outlined to his commodity and demonstrate its soundness.

If the large railway groups which recently obtained Parliamentary Powers to engage in road transport work had been put under the obligation, as was at one time suggested, of keeping separate depot or town costs, the "Overhead" factor carrying with it a percentage of Administration Expenses (15) would have been of considerable importance so far as their Expense Account was concerned.

Now let me strike a cheering note in this mournful tune of costs.

An item not infrequently overlooked by ancillary transport undertakings is the distinct advertising value which exists in well-kept vehicles, and in this connection the Yanks have a slogan that "painting pays dividends." Does your company take cognizance of this point in its Profit and Loss Account, in the form of a book credit? Probably not, because if brought into accounts it might raise the highly contentious question of liability to Income Tax! Receipts in respect of outside advertising are obviously revenue and therefore taxable.

Many firms whose names will readily occur to you, obtain a full measure of the advertising value of a commercial vehicle by fitting special bodies designed to represent their particular article of merchandise, e.g., Palmer Tyre Co. (large tyre section), Thermos-bottle body, Electrolux cleaner body, Fountain-pen body, Hot-water geyser, Odol dentifrice, Watney's beer-barrel body, Spiller's food (plate-glass show-window).

Apart from such striking advertising displays, smartly conditioned bodies, with their owners' name in striking characters, are not without advertising value. It is a matter for considered judgment how far one should sacrifice utility by departing from the useful rectangular for the purpose of securing advertising value.

If there is a difference of opinion as regards the advertising value of a transport vehicle body, few will dispute the view that dirty and ill-cared for vehicles are a reproach to the firm using them, and brand the house in a corresponding degree.

It was observed, on page 176, that we should ascertain how overheads could be eliminated, reduced or *deferred*. Doubtless the last term puzzled many hearers and I will now proceed to throw light upon the expression.

Problems incidental to the distribution of Overhead Expenses are treated in a manner, startling in its novelty, in a pamphlet prepared by the Department of Manufacture of the United States Chamber of Commerce, Washington, D.C. Originally issued in 1924, when industry generally was experiencing the results of the severe depression following the World War, the pamphlet was amplified and re-issued in 1927, and recently came into my possession through the courtesy of my friend, Mr. Coker Clarkson, General Manager and Secretary of the Society of Automotive Engineers, New York, to whom I applied.

The gist of the principles—somewhat daring to our conservative nature—outlined in this thought-provoking brochure is expressed in the following :—

A Normal Year—the Business Standard.

> Our cost systems are far too rigid. Under cost methods still largely in use, overhead expenses are spread too thinly in times of forced production and, massed too heavily in periods of slight demand and production, giving in the former case costs that are artificially low and unfair to the management, and in the latter case costs that are artificially high and unfair to the public, and moreover costs which the market will not sustain.
>
> For the sake of convenience, we split up our business into years and treat each year separately. On the basis of a fiscal year we determine the profits for the period and distribute them to the stockholders accordingly. This is well and proper, but when it comes to the distribution of overhead expenses to our product cost for the purpose of making or gauging our selling prices it is desirable, indeed important, to select a longer period than one year, or, in fact, consider the actual overhead expenses and volume of business for several years.
>
> There are expenses, which continue whether the plant is idle or in operation, expenses that moreover, bear no direct relation to output. Cost systems should provide that these expenses, usually designated as overhead expenses, should be absorbed and pro-rated on the basis of a *normal year*—that 100° mark on the business thermometer. Thus, in a season of unusual production—production exceeding normal—the overhead should be more than used up in costs, and a surplus out of overhead cost created to take care of those periods of the year when the output is below normal and the overhead charge not fully absorbed.

(A simple illustration of the working of this overhead appropriation is then given in the pamphlet).

> This method of cost procedure has numerous advantages. For one thing it will eliminate the needless throttling of business by the impracticable attempt to load sub-normal production with greater charges than can or should be borne.
>
> *Operation under a normal year basis.*
>
> The determining of a normal year is not an easy matter. It requires a long look behind and a far look ahead. It is by no means sufficient to accept the operations of the preceding year as the sole standard. The normal year is different for a new organisation or industry from what it is for one long established.
>
> To establish normal unit overhead charges, two things must be determined :
>
> (1) Normal overhead expenses for the various department of the business
> (2) Normal production.
>
> When the normal overhead expenses are divided by the normal production, the result is the normal unit overhead charge
>
> *Necessary Cost System Adjustments.*
>
> The accounting device used to secure operation on a basis of a normal year is the now familiar one of the Reserve, or a modification thereof.
>
> For the purposes of illustration, although the situation is not identical, let us recall how a simple reserve, such as the reserve for bad debts, operates.
>
> *Some Misunderstandings Clarified.*
>
> I. The setting up of estimated overhead charges based on a normal year does not mean the abandonment or compromising of actual overhead costs.
>
> II. It is not the intention to forego or wipe out a single dollar of overhead expense that can be legitimately and fairly charged to operation, sales or administration.
>
> *Found Feasible in Practice.*
>
> What has been stated is elementary and suggestive. Its aim is to stimulate interest and encourage such changes as are necessary to meet progressive competition.
>
> Upon inquiry of the Department of Manufacture, establishments in such widely separated industries as paper, cutlery, envelopes, stove, and metal products are operating on the basis of a normal year and upon this basis distributing overhead.

The pamphlet concludes with this sage observation :—

> The treatment of overhead in the way indicated is not a panacea for all our industrial ills. The control of overhead in a manner fair to the business man as well as the consumer is one step and only one step toward realising more stable prices and eliminating those wild fluctuations that culminate in industrial depressions.

Presumably it is much too revolutionary a step for our Board of Trade to assist the industrial community with a pamphlet on the subject, if not on similar lines. But perhaps one may inquire what our Chartered Institute of Accountants or similar body is doing to assist business in the direction under discussion ?

Now taking the figures given on page 180 and applying *deferred* appropriation overhead charges, say, for example, 40 per cent., we get this:

500 cars per annum.

Wages and materials	£30,000
Fixed charges £30,000, 60 per cent.	18,000
500)	48,000
	£96 each

And with the increased output of 600 cars per annum.

Wages and materials	£36,000
Fixed charges £30,000, 60 per cent.	18,000
600)	54,000
	£90 each

Fuel.—In the search for the most economical fuel it is frequently necessary for operating engineers to make numerous practical experiments. Although the only help I can give in this connection is somewhat of a negative character, it may nevertheless be of some service.

From time to time careful records, by a simple and not costly method, have been kept of the m.p.g. secured over recognised regular services by a large number of vehicles and some interesting, but at the same time peculiar, results have been registered. Tests of well-known popular spirits (not job lots, which occasionally come on the market)—let us call them A, B, C and D—have been made on three principal types of vehicles, say F, L, H and M (Fords; light vans (other than Fords; Heavy Lorries; and Motorcycles); and it has been found that whilst the spirits may come out quite definitely in order of merit A, B, C and D in the case of Fords, the same order did not hold good for any one of the other three types. Some months later further tests showed that the order of merit with Fords was probably B, A, C, D, and other variations of order in the remaining types. Similar fluctuations arose when trying various number three grades of some of the suppliers, for test purposes these being of course treated as new fuels. It should be observed that none of the fuel companies had knowledge that the tests were being made and that the spirits tried out were purchased in the ordinary way of trading. Presumably the vacillating results were due to variations in the quality of spirit. In order that the personal equation in these trials should be eliminated as far as possible the tests were always made on a very large number of vehicles and in many different parts of the country.

One useful fact does emerge from these tests, and that is that the best spirit for heavy lorries is not necessarily the best for other types, " best " being used in the sense of m.p.g.

Many years ago I found as the result of a long series of tests on the same heavy lorry, over the same long route, but with different drivers, that a mixture of three parts of No. 3 petrol, with one part of Benzol, gave the highest m.p.g., but more recent tests under similar conditions failed to confirm the early results, and running on straight petrol was resumed.

This seems an appropriate place to offer a brief observation upon ethyl. Much alarm (some real and some " interested ") has from time to time been expressed as to the poisonous qualities of ethyl gas, and not infrequently, tests, by more or less competent experimenters, have been carried out to determine the degree of danger, if any, of using this particular fuel. The only observation I wish to make is this: that whenever a new chemical compound is invented or discovered, difficulty in the manufacture and use frequently arises in the early stages of its introduction, *but it is usual for all such difficulties to be overcome by the application of simple precautions* There was a similar apprehension when celluloid articles were first introduced, and still later, when petrol was first used.

Oils.—In a similar search for the most economical lubricating oil it might at once be mentioned that really satisfactory supplies (satisfactory both as regards quality and price) are obtainable from purely British manufacturers; the origin of the crude may not, of course, be British, but when the usual refining, distillation and blending operations have been carried out, satisfactory and consistently good results have been secured from purely British manufacturers.

The practice is probably universal for all vehicle manufacturers to impress upon their customers the importance of using only high-grade oils if they wish to secure good service. Most of us have found it difficult to follow the petty whimsies and fine-spun casuistries of the oil traveller, but space again bids me take heed, and on this occasion it should merely be observed that " high-grade " oil is not necessarily synonymous with " high-priced " oil. I must content myself with the expression of what I believe to be a golden rule:—

Continuous skilled care of the condition of the bearings and shafts is essential if the lubrication problem is to be successfully mastered—" mastered " in this case embracing the all-important matter of economy in consumption. If the practice enunciated be diligently pursued there is hardly any factor in vehicle maintenance that will better repay one.

As must have been the case with many other fleet operators, I was grievously troubled at the loss of gallons of cylinder oil when large engines were taken down for overhaul or other reason, and very many years ago I tried the scheme of again bringing into use the drawn-off oil. The oil drawn off from one type of vehicle (the small vessel used for drawing off was kept scrupulously clean) was stored in a receptacle and allowed to remain for a week or two, thus giving the fine solid particles (dirt or metal) in suspension time to settle. A quantity of the used oil was then put into a large cylinder and the upper strata syphoned off into a filter chamber—electrically heated, to facilitate flow and to drive off any lighter diluent such as petrol—and the oil thus treated was returned into the engine sump after being mixed with an equal quantity of entirely fresh oil of the same manufacture, *i.e.*, 50/50 old and new oils. This apparent misgiving (adding fresh oil) on my part was due to a slight doubt that the old oil might possibly have diminished in lubricating value.

I am fully aware that it is not possible by simply filtering the used oil to eliminate the very finest particles of carbon, but I countered this objection, when raised, by inquiring if the objector was prepared to demonstrate that such minute soft particles were in themselves deleterious ; it may be rank heresy, but I do not think any harm is caused by their presence, believing them to partake somewhat of the nature of a solid lubricant, *e.g.*, natural graphite, asbestos and the like, and I would be glad to hear the views of oil technologists on the point. Prominence to this oil kink was given a year or so ago by one of our leading Transport Journals. This fact, at any rate, emerged from my tests : no breakdown, or excessive wear on bearing surfaces was ever traceable to the use of the mixture and the saving in a year's consumption ran into a considerable sum. Recent inquiry has elicited the fact that the practice thus instituted still continues with substantial savings.

The subject of lubricating oil cannot be more aptly closed than by repeating an observation made many years ago by my friend Mr. Meyrick Jones, A.M.I.M.E., which expresses most succinctly the whole question of lubrication. " Generosity is expensive and messy, niggardliness is dangerous." Pages cannot point a moral so effectively as these few words.

Effect of Design upon Maintenance.—Time preventing too great an elaboration of design features, such as Brakes, their functioning and methods of operation ; Carburation characteristics, etc., etc., and bearing in mind that the subject is Cost Reduction, I must content myself with inviting attention to one point only, namely, weight reduction.

Whilst time will not permit a discussion of the vexed question of unsprung weight, the subject is mentioned merely to provide the opportunity for urging that designers should continue to study this important factor in, among other things, tyre costs. From unsprung weight it is a very short step to the consideration of springs and spring design, but in passing on rapidly to other problems I desire to observe that there is still fame and fortune awaiting the *enfants perdus* of Science, as they have been called, who will give us a spring that while functioning efficiently with a full load does not hammer unmercifully human, as well as inanimate, freight, when partly loaded.

Students in " Spring Design " will probably be told that the ground has been thoroughly covered and nothing more can be done. It is possible, of course, to prove by logic almost anything cannot be done, but the deuce is that whilst we are arguing, someone is doing it, so I trust that " automobile evergreens " will continue " hopeful," remembering " Conquest ensues where courage leads the way."

It is of the utmost importance that designers give special attention to keeping down dead and useless weight in both body and chassis, as any unnecessary weight continuously and cumulatively makes its influence felt under so many heads, as to be almost impossible to assess with any degree of accuracy. Many years ago when the Post Office Department instituted its own model of bicycle, I expended a large amount of time and trouble in effecting a reduction in the weight of the machine without unduly impairing its strength for the arduous conditions of service, and finally the question resolved itself into saving an ounce here and an ounce there. Similarly I believe it is up to designers of commercial vehicles to jettison a pound here and a pound there. In the case of the bicycle the results achieved meant reduced nervous exhaustion and less expenditure of muscular tissue on the part of the rider, but in the case of the commercial vehicle it means less expenditure in various directions of pounds, shillings and pence. Incidentally, in this connection it is not irrelevant to mention one of the great advantages of road over railway transport, namely, the great reduction possible in the strength *and weight* of packing cases and materials for most classes of merchandise.

People have for many years associated weight with strength. Plenty of beef in design may look well at Olympia, but the economical value of low weights, consistent with essential strength and rigidity, is of primary importance in economical running, and it behoves designers to give more than cursory attention to this subject. Unnecessary weight means waste; as Henry says, "Weight is only useful in a steam-roller. There is but little doubt that the employment of steel pressings scientifically welded or of some of the lighter metals and woods, or a combination of both, on parts where sheer strength is not of paramount importance, is one direction in which improvements might be made.

Mainly as a provocative I seriously submit that most designers are largely deficient in the dramatic instinct, which enables a man to put himself for the moment into the condition and mood of men entirely unlike himself in training and conditions, really an indispensable element in the make-up of an efficient designer. Granted it *is* difficult for a man with the engineer's knowledge to visualise the ignorance of the average user of vans. The dramatic instinct cultivated in other spheres—administrative and managerial—is not, of course, without profit.

Better co-operation between the chassis and body departments is called for. Erecting and fitting is an easy job in the makers' works where all adjustments are made with free head room; when the stature of the late Little Tich is standardised by the S.M.M.T. or B.E.S.A. for all drivers and mechanics, then detailed adjustment on the road upon carefully stowed away parts may be possible. Many accessories, too, might be considerably lightened without lowering their efficiency.

Some folk imagine a job cannot be done too well, a view to which I do not subscribe. There is quite a lot of work too well done; it will probably be agreed that here we have a question of peculiar difficulty, as if a comparatively low standard of finish be permitted for any part, what will be the effect upon the mechanics, when working upon other parts, demanding a higher standard? It may be the solution would lie in a higher inspection standard; perhaps where craftsmen are not involved, and production is pure repetition in the hands of machine tenders, the point does not become acute. But how about a highly finished exterior of a cylinder casting? Does it produce another H.P. or not? Again, machining the curved surface of an oil inspection door, and similar work of a costly nature, can be completely dispensed with by using an efficient blanketing material, which I believe I was the first to use some few years since. Believing in passing on a good thing, especially as it is British throughout, I do not hesitate to name the material in question, "Langite," made by the Cork Manufacturing Company of Chingford. Although apparently most manufacturers seem to be using this in one form or another, very few seem to be taking full advantage of its use to eliminate or reduce machining.

Depreciation.—I prefer to put this as a Running Cost rather than a Standing Charge, although it is agreed depreciation goes on even if, and when, the vehicle is standing idle for any appreciable degree.

As regards the method of calculating depreciation I would refer to my Paper on the subject read before the Society of Automobile Engineers in America in 1913 and published in the Proceedings* of the Institution of Automobile Engineers. The only additional observation I have to make is that as the result of subsequent experience (*i.e.*, subsequent to 1913) and discussion with my late colleagues in the Post Office, an average life of the various classes of vehicles for the purpose of depreciation can be decided upon and depreciation calculated on the straight line method—with a residual value of 20% in each class of vehicle—which, by the way, may range from a motor-cycle combination up to a 12-ton lorry. Obviously the residual value will vary in proportion to the amount spent upon maintenance, and the almost perennial cuts in market prices of vehicles.

It will be seen in the Main Expense Schedule that I have differentiated between the chassis, body, etc., a practice which is recommended, especially in view of the fact that many costly bodies have now been brought into use, which should outlast two or more chassis.

Interest Charge on Capital.—There are at least two schools of thought, holding diametrically opposed views, on the question of inclusion in the operating costs of an interest charge in respect of capital, and whilst recognizing that the question is extremely polemical, I would express a bias for the inclusion of such a charge in the Total Bill of Costs. Be that as it may, there can be no question that if money is borrowed to function a business, as, for example, to buy vehicles in a road transport haulage company, then any interest charge payable on the borrowed money is an operation cost, and must be borne accordingly.

Insurance.—It is perhaps a moot point as to whether vehicle insurance should be for "all risks" or only "Total Loss and Third Party Liability." So far as accidental damage is concerned, it is at times difficult to differentiate between accidental and ordinary maintenance repair work. Where one has a good repair shop, or moderately skilled mechanics are employed, numerous minor repairs are effected and debited to maintenance that might equitably be claimed under

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* Vol. VII. p. 527, *et seq*

MAIN EXPENSE SCHEDULE.

Running Costs

(1) *Fuel*

(2) *Oils*
Grease
Cleaning Materials
(3) *Maintenance* (Material and Wages)
  Chassis.
  Body
  Accessories and fittings.
  Tools (including rags and waste)
(4) *Depreciation*
  Chassis (less tyres and wheels)
  Body.
  Accessories and fittings
  Tools.
(5) *Tyres* (new and repairs)
(6) *Wheels* (repairs)

NOTE —Additional items must obviously be added to 'Overheads where they are special to particular work, such as "tickets and way bills in 'bus practice

Standing Charges

(7) *Interest on Capital*

(8) *Insurances*
  Vehicles
  Health and Unemployment
  Employer's liability
  Fire
(9) *Garage*
  Rent and Rates
   (including water)
  Maintenance repairs and fixtures
  Power
  Heating
  Lighting
  Cleaning
(10) *Wages*
  Drivers
  Mates
  Storekeepers
  Cleaners
  Mechanics and Foremen
  Experimentalists and
  Testing Staff
(11) *Clothing*
  Uniform
  Protective.
(12) *Licences*
  Vehicles
(13) *Depreciation*
  Garage
  Garage fittings
  Garage plant and tools
(14) *Waste*
  Packing materials, ropes, sheets and small tools (files)

Overhead Expenses

(15) *Administration* (Directors fees, whole or proportion)
(16) *Management* (Salaries)
(17) *Supervision*
(18) *Travelling Expenses*
(19) *Commissions* (Travellers, etc)
(20) *Clerical Salaries*
(21) *Office*
  Rent and Rates
  Insurances (staff and building)
  Equipment (and maintenance)
  Heating
  Maintenance repairs
  Lighting
  Cleaning
  Depreciation (furniture and appliances)
(22) *Stationery and Printing*
(23) *Telephones, Telegrams and Postage Carriage*
(24) *Advertising*
(25) *Subscriptions and Donations to Trade Associations and Trade Journals*
(26) *Bank Charges*
(27) *Incidentals* (expenses not already classified)
(28) *Legal Costs and Fines, Patent Fees*
(29) *Audit Fees*

an insurance policy, but the trouble and difficulty in coming to an agreement renders such procedure not worth while. Probably the solution is to be found in "the assured bearing the first part of each accident," with a corresponding reduction in the premium. As regards pleasure vehicles, it is a difficult point to decide; much can be said on either side. But it is thought that "Total Loss and Third Party Liability" insurance of vehicles will generally be an agreed item—and even if the organisation is of sufficient magnitude to carry its own insurance, then a charge (the recognised standard rate made by an Insurance Company) should be debited as an operating expense. This will, at any rate, make the operator's costs comparable with those of another.

In conclusion: King Solomon, who, in his time, was one of the greatest employers of skilled labour, a real Captain of Industry, as the term runs, and who, rightly or otherwise, is credited with an abundance of wisdom, discovered and placed on record (Proverbs xi, 24), "there is that scattereth and increaseth yet more." I would commend this ancient and sterling advice to those of my hearers, who, possessing information on the points raised, are not disposed to pool their knowledge

Whilst it is much easier to criticise than to correct, fair criticism is welcomed, for the critic has his proper place in the scheme of things if only as a constant spur to efficiency.

BIBLIOGRAPHY

Whenever I have consciously derived assistance from the work of previous writers due acknowledgement has been made; should I have inadvertently put forward as original an idea previously published, I can but observe that "when a thought has lain molten in a man's brain and been hammered into shape on the anvils of his imagination, it is his own, although a thousand mighty voices may have given utterance to it before."

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DISCUSSION.

The Chairman said that before he invited general discussion, he would like to make a few remarks, though he would not attempt to deal with the technical side in regard to the design of the vehicle, the fuel to be used, and similar matter. On the question of keeping accurate costs, the lecturer had referred to the large number of headings on the customary forms. The speaker was of opinion that the success of any scheme of accounting of costs depended very largely upon the way in which the headings were laid out, and the study which was put into them. The staff, when they came to fill in the records, should never have any hesitation as to the heading under which a particular item should be placed. If sufficient thought were given to the headings, so that there was no possibility of their being misunderstood, something reliable in the way of results might be expected.

The lecturer, in speaking of the lengths of pedantic accuracy, had instanced the case of Mount Everest, which, he learned in his early days, was 29,002 feet high. Nevertheless, the speaker had found that if one were making a statistical statement, it was the easiest thing, after all, to take the shillings and pence, or the decimal points, and not to rely upon the broad even figures. If one did adjust figures to a broad level, leaving out the shillings and pence, it was very likely that a great deal more time would be wasted afterwards in finding out which item had been adjusted too loosely than would have been spent at the beginning in a close computation.

With regard to the lecturer's definition of "overhead," namely, "overhead expenses include every chargeable component other than wages and materials employed in the functioning of a business," he felt that the definition was not a good one from the manufacturer's point of view, because the overhead expenses included a very large amount of wages. He would like to see a better definition than that, though he was not going to attempt one himself.

With regard to the American scheme which the lecturer had described, of carrying forward a portion of the fixed charges into the next year, this was very good if the matter were taken from the sales point of view, but at the end of the year when the balance sheet was placed before the auditors, they were not likely to allow something to be carried forward as an asset which, while not at present an asset, it was hoped would be such in the near future. Therefore, the carrying forward of this portion of establishment charges depended upon the ability to fix upon a normal year. The difficulties which he himself had encountered in this respect might not be the difficulties of others, but since the war, or since the slump in 1921, efforts to get down to a normal year had been wholly unsuccessful. This was because of improvements and alterations in design and manufacture, and the distribution of establishment charges did not stand still, so that alterations had continually to be made. He supposed that if they could sit down and make one kind of vehicle, and one only, over a number of years, normality might be reached, but under present conditions he did not see how, at any rate in commercial manufacture, the normal year was to be obtained.

There were very many ways of distributing overhead charges. The rough and ready method was to take a percentage on the labour and material. That was a bad method. Another rough and ready method, rather better, but still bad, was to take a percentage on the labour. The problem was that if a vehicle were made it had to be sold as one unit, and also to be sold as 500 units—that is to say, the manufacturer must know the cost of the parts if he was to do the thing properly. The only way of distributing the overhead charges with approximate correctness was to distribute them on the basis of hours worked. The hours worked in the various departments were obtained, the expenses of those departments were also taken, and the expenses placed on the hours worked. The time worked by an apprentice might represent 3d. an hour, and the time by an ordinary workman 1s. 6d. an hour, so that to put the establishment charges on the basis of labour alone might give a result very wide of the mark. No proper distribution was obtained by taking a percentage on the wages; it must be taken on the time actually worked.

With regard to depreciation there was one interesting point. Here he noticed what he thought must be a misprint in the printed paper, which spoke of a residual value of 2 per cent. in each class of vehicle. The lecturer had said 20 per cent. But he was hoping that it was 2 per cent., and honestly he felt that 2 per cent. residual value was a great deal nearer the mark than 20 per cent. under present conditions.

MR. A. J. WALDEGRAVE (Deputy Comptroller and Accountant-General, G.P.O.) said that as a very old friend of the lecturer's, and one who had been in fairly close touch with him until the time when, to the great regret of his colleagues in the Post Office, he had to give up the work, it had given him great pleasure to listen to the paper, the more so because the lecturer's racy manner made one feel that the effects of the illness from which he had been suffering were disappearing. The lecture had brought out a very large number of important points in connection with the profitable running of a motor service. The point of chief interest in the paper to those who were concerned with the accounting side was perhaps his treatment of overheads, and here he must agree with the Chairman that the lecturer's definition of overhead costs left something to be desired ; it seemed to him to be too simple. Everyone liked simple things if they could be obtained, and in that connection he might say that he appreciated the lecturer's preference for the straight line system of depreciation, which had the great merit of combining simplicity and safety. But there were cases in which it was possible to be too simple, and he thought the lecturer had been too simple in his definition of overheads. He had stated that overheads consisted of all expenses other than wages and materials. That was not a universal definition of overheads, as could be illustrated from a branch of the Post Office business, which corresponded, of course, with any shop business in this respect. In the Post Office, or in a shop, there must be a staff on duty from the time the counter was open until it was closed, and yet for a considerable part of that time no customer might be engaging the service of the man or woman on the other side of the counter. In the case of the Post Office the amount of unoccupied time in that sense—not wholly unoccupied, because, of course, people were doing odd jobs in the intervals—was very considerable ; indeed it was so large that if he gave the figure it might be said that this was another instance of Post Office inefficiency. But in any business it was a large figure. Now, that amount, which was wage cost, was really overhead. This was a case where the wages were themselves overhead costs. Perhaps as a comparatively simple definition of overhead, he might suggest that overhead costs were the expenses which did not vary directly with the volume of business. They either did not vary at all, or, what was more common, they varied indirectly. He would say that expenses which did not vary at all only occurred in the case of absolutely stationary business ; if the business was a developing one, the overhead expenses varied, perhaps spasmodically or perhaps regularly, but varied as a rule indirectly. The relation of that indirect, and it might be spasmodic, variation to the direct expenses was a matter for individual study. It could not be said to be the same in any two classes of business, or in any two businesses, but it was just the study of the relation between those two things which made the difference between the running of a business properly and improperly.

In running the motor business, for example, which the lecturer had left as a legacy to the Post Office, what, precisely was the business ? Was it to run so many miles, or to deliver so many parcels ? The postman-driver had to leave his vehicle to deliver parcels at a house ; he might have to walk up the drive, and if it was a cash on delivery parcel, to collect the money, and all this time the engine might or might not be running, according to the regulations and the way in which the man concerned observed them. But the running of the engine was of the nature of an overhead cost, although it was a running cost. Whether a thing was a running cost or an overhead cost depended partly upon the nature of the business, and this made it difficult to get down to units in a business like that of the Post Office. All the expenses which were going on, due to waste of time, whether the loitering of the driver, his failure to fit in closely to a schedule, or, perhaps, the accountant calling for accounts, and so on, if it could be cut out, was so much saving.

With regard to depreciation, he did not agree that this should be treated as a running cost. Part of depreciation was wear and tear that varied with the running, part was wear and tear that did not vary with the running, and part of it was simply due to lapse of time, or obsolescence, which took place whether the car was running or not. Again, he would suggest that the lecturer had tried to simplify things a little too much.

Major E. S. Beaumont said that the lecture had covered a very wide field and it would take a long time to discuss the numerous questions which had been introduced. The question of overheads was capable of much further argument than could be given to it that evening. The lecturer had made one statement with which he was much in sympathy, namely, that the first requirement was that one should somewhere and somehow include all the costs. A mistake might perhaps be made in including what was a fixed charge in a running charge, or vice-versa, but what was wanted first of all was the final result, and secondly, the analysis of the costs.

A confusion seemed to exist between what he himself would regard as depreciation proper, namely, obsolescence, the writing-off of plant value on the one hand, and maintenance and repair charges on the other. Those were distinct things, and should not be merged in any way.

The question had been raised as to how far costs should be detailed. The speaker had had occasion to devote a good many years of his life to the study of these questions, and he had early come to the conclusion that the mere accumulation of figures and forms served very little useful purpose. The fundamental thing was to set up a system capable of being digested by those who were responsible for carrying out the work. He knew that there was a certain moral value attached to forms. If they had to be observed there was a probability of continuing good behaviour on the part of those members of the staff who had to be watched or directed. But the primary purpose of any system was undoubtedly to know where the money was going, whether things were improving or not, and again from his personal experience he found that these fundamental things could be ascertained with quite elementary recording systems. The Chairman had referred to the fact that the principles of precision and accuracy must be supported, but the speaker felt that when it came to statistical facts upon which sound conclusions had to be reached, simple systems, as a rule, sufficed very well.

The statement that not to spend money did not necessarily mean economy, was very true. It was only necessary to instance the fact that things could be bought too cheaply—that while less expenditure was incurred, such expenditure was incurred improperly.

Some of the figures which the lecturer had given might be criticised, but he had reminded his audience that the different transport organisations and businesses differed very greatly from one another. In fact, it was difficult to establish a proper comparison between one set of cost figures and another set. Not only did the circumstances of the [illegible] vary, but the systems employed by different firms varied, and therefore, if one set out to exchange costs with the idea of discovering how one stood in relation to somebody else, it was inevitable to make allowances for certain factors which one or other had not got.

He agreed also entirely with the reference to invisible losses, lost vehicle time, or lost repair time. This was one of those things which were considerably neglected, and by no means sufficient attention was given to the waste transportation of dead weight. Even the majority of vehicle workers, he believed, failed to appreciate that the carrying of a spare can of petrol was often a source of weight and not of economy.

The question of the standardisation of the fleet with a view to achieving working economies was good so far as it went, but there was the old proverb about not putting all the eggs into one basket. Otherwise, to secure group standardisation was to do well. He cordially supported the reference for the need of a cultivation of good spirit in all workers engaged in the transport industry, whether those working on an hourly wage or those in responsible positions.

On the question of deferred overheads, he thought that the invention of that system should not be conceded to America. It had been tried in a variety of forms in this country, for example, in connection with the general overall costs of motor vehicles. So long as a man knew what he was doing and was making proper provision for the expenditure, he supposed that no danger was incurred, but for the rest so far as the overhead charges were concerned, and the prediction of a volume of business which would enable those charges to be spread accurately over the future, one was perhaps on dangerous ground.

MR. E. VICTOR AMSDON stated that during the war he was in a Government Department, and even in a Government Department it was quite easy to see the advantages that accrued from such an analysis of charges as had been given that evening. By means of this costing, the cost of tetranitrotolulol was reduced during the war from 3s. a pound, which was being paid to America at the start of the war, to somewhere about 10d. or 11d. a pound in Government factories in 1918. This was brought about merely by a co-ordination of costing in the various factories. For this reason he did not think any smile should be raised when the question of costing in Government Departments was discussed.

The Chairman had stated the very good rule that the financial accounts should be agreed with the costs, but the speaker would venture to say that in the majority of financial accounts at the present time things were not included which did come within the category of costs in a very large number of manufacturing concerns. The items to which he was referring and which might eventually be shown in the financial records were such things as losses. There were a large number of losses which had to be worked out into money, but which it was very difficult to assess. Then there was another point, namely, the question of the distribution of overheads, and whether it should be based on materials and wages, or on wage values alone. On this particular point the Chairman had said that he thought it should be placed on a man-hour basis, and the speaker was inclined to agree with him that the man-hour basis was a good one. If one took the management salaries which sometimes loomed rather heavily in the overheads, these bore relation to time, as well as did other things. There was some relation between the time for which the workers were occupied in doing a job, and time in its relation to overheads.

The question of decimal points had been mentioned as being a good way of keeping accounts. From the experience of keeping a private ledger in pounds and decimals of pounds, he found it much more difficult to discover differences in that way than if he had kept the ledger in the ordinary manner in pounds, shillings and pence. The use of decimals had to be looked upon with particular care. If they were taken to three places and added together quite big differences were sometimes forthcoming.

Mr. John Walton said that without wishing to be unduly critical of the lecture, he thought the lecturer had skated rather lightly over a number of points. In considering costs from a company's point of view there had to be considered the financial accounts, the operating accounts, and the engineering schedule of repairs. From an operating point of view, in a properly constituted business, care would be taken of the overheads which came from the engineering side as a fixed reserve, and these would be carried on right through the year. The engineer had to have detailed costs and to make up his overheads into detailed figures, which should be linked more or less with the reserve. He was inclined to agree with the Chairman that the man-hour system was the only way in which it was possible to obtain a satisfactory account for an overhead.

Mr. Victor Amsdon hoped he might be permitted a further word about deferred charges. As the Chairman had said, it was difficult to get a normal year. If a normal year could be found so much the better, but within the normal year, if it was necessary to deal with short period costs, the question of seasonal variations came in. He would like to know whether it was advisable, supposing the output was low in one month, to vary the overhead charges accordingly.

Miss M. S. Neall complained of the remark of the lecturer that cost accounting was too rigid. She would suggest, on the contrary, that rigidity was very necessary. It was essential that every expenditure should be known. If it was known it enabled one either to keep a department running or to shut it up, or, alternatively, to reduce the overhead charges. She maintained that all costs must be rigid.

She was also surprised that the lecturer had not mentioned the question of carrying full loads in transport. In the business in which she was engaged the endeavour was continually made to cut out unproductive time, and to reduce every cost; but when this had been done it was necessary to see that the vehicles were fully loaded.

So far as carrying costs to reserve was concerned, surely the ideal that the costing accountant should aim at was to cover his expenses month by month. If this were done the directors were in touch with the business as it was going. She suggested that transport costs should be covered in this way, even journey by journey and load by load.

Capt. A. Hudson desired to emphasise the point made by a previous speaker that the records could be over-elaborate. While it was desirable to have every item of costs, he was a firm believer in the necessity for cutting out unnecessary records. He could exemplify this by mentioning that a few years ago it was his privilege to go with a colleague to Germany to investigate certain features of Government transport in that country. The cost record system in vogue was examined, and he was amazed to find that a nation which was supposed to be a pattern of efficiency kept records such as a detailed mileage record for every tyre on every vehicle. There had been another example of the same sort of thing in the remark of a previous speaker about the Post Office. Was it a proper thing to charge up to overhead or running cost that proportion of the vehicle's time while its engine was running when the man in charge got out to deliver a parcel? This seemed to him another example of what the costing accountant would do if he had the opportunity. The accountant set out on the one hand to bring down the overheads, but on the other he was bringing up the cost of accounting.

Mr. Waldegrave explained that he had not made any such suggestion as that the cost of the time while the engine was running should be computed. He had merely brought forward that case as a passing illustration.

Mr. R. P. Bradley said that during the last three years he had been concerned in the winding up of a firm whose cost system consisted of nothing else but the cost of wages and material; account had not even been taken of rent, rates, taxes, power, light, or anything of the kind, and the firm had lasted for five years; it was true that it had a millionaire at the back of it, but even he got tired at the end. The trouble he found in business was not so much in learning what the overhead charges were, or what they amounted to, as in finding a method of charging up to individual jobs. He thought that every type of business had to find a costing system of its own. No costing system would apply to every business. For example, if the hours-wages basis were taken there might be one man in charge of a machine which cost £10 and another man in charge of a machine which cost £5,000. There must be a different overhead on the time of those two men.

Mr. W. Cully said that whatever the costs were it was essential to have them all. The lecturer's definition of overheads would read more correctly if he said: "Overhead expenses include every chargeable component, other than *direct* wages and materials." With regard to the insidious losses incurred by standing time, he thought it was important to refer to the training of drivers and the avoidance of accidents which brought not only direct loss, but bad repute and indirect loss, and the fatigue in labour, which he knew the lecturer had studied. The last speaker had mentioned the case of Woolwich Arsenal, and what he had said was perfectly true, except that it related to affairs twenty years ago. It was not true to-day. What the Chairman had said as to the correct way of charging costs was now actually the method used in Woolwich Arsenal, and involved no difficulties.

Major Wheeler, replying on the discussion, said that it had been generally more on the accounting than on the operating side. He was glad that the Chairman agreed with his idea of having printed forms, and the value of blank spaces, ruled squares and the like. These things were essential. A blank space on a form was intended to "hit the fellow in the eye," and that was what was wanted.

The Chairman had also made a reference to his remarks on punctilious accuracy, or accuracy carried to ridiculous lengths. His illustration regarding the height of Mount Everest had an interesting little explanation given by Mr. Ackermann in his book "Popular Fallacies." Ascertainment of the height was made originally by a Frenchman, who gave it as 8,840 metres, and then someone converted this into feet, and failed to make the final digit a nought.

With regard to the kind personal remarks of Mr. Waldegrave, he would like to tell him that premature retirement did not mean leisure, but exquisite mental torture in the form of futile fretting for the past and sorry despondency for the future. Mr. Waldegrave had criticised his definition of overhead costs, but Mr. Waldegrave's alternative definition would show how overheads behaved, and not what they were. In trying to get his own definition, he was, of course, endeavouring to get it into the smallest possible space ; he could have extended it over a whole page.

Mr. Waldegrave had certainly raised an interesting point as regards running and overhead cost allocation in the case of a postman delivering a Parcel and leaving his engine running ; but fortunately the all-important point was that the total cost would be included somewhere, although perhaps not strictly allocated.

In reply to Major Beaumont, he did not think that costs could be detailed too far, always, however, with the proviso that one did not overload the establishment Major Beaumont had been inclined to differ from him on standardisation in not having all one's eggs in one basket. His answer was that this was a point to be aimed at, but the difficulty in ever achieving it was its safeguard. Major Beaumont also stated that deferred overheads were not a new thing. That was quite true, but his point was that in the past this had been dodged by accountants and others, and the thing really wanted to be regularised.

The remark about costing systems being far too rigid, of which Miss Neall complained, was not his own words, but a quotation from the American pamphlet, passages of which he had read. He agreed that costing systems must be rigid in their compilation. Miss Neall had also spoken of the need for full loads. That, however, was not the engineer's job ; it belonged to the managerial side. As to depreciation, a stage had now been reached when mileage and time could be blended in arriving at the estimate of this factor.

As regards Mr. Cully, he rather reminded him of the Immortal Oliver, " Please sir, I want some more." It was true that he had made some close investigation into the field of the effects of fatigue upon labour, but this and other phases, belonging more to the sphere of management than labour, must be relegated for discussion on another occasion.

On the motion of the CHAIRMAN, a hearty vote of thanks was accorded to Major Wheeler for his lecture, and the proceedings terminated.

CORRESPONDENCE

THE " WILLANS " ENGINE

On Page 36 in your issue of the 22nd inst., there is an allusion to the engine invented by my old school-fellow, Peter Willans, as having been first used by Colonel Crompton directly coupled to a dynamo ; but the " Willans " engine had been so used already in my presence at the Thames-Ditton Works in the Spring of 1882 ; and the first appearance in public of such combination occurred in October, 1883, in a train-lighting experiment on the District Railway, as described in a Paper read at a meeting of the Society of Telegraph Engineers, on the 13th March, 1884.

On Pages 12 and 54 of Berly's Electrical Directory, issued in November, 1881, Messrs. John and Henry Gwynne and Mr. Hodson had illustrated advertisements of their engines coupled directly to dynamos.

W. H. MASSEY, M.Inst.C.E.

NOTES ON BOOKS

ENGLAND IN THE NINETEENTH CENTURY. 1801–1805. By A. F. Fremantle. London: Allen and Unwin, Ltd. 16s.

Mr. Fremantle's book is of absorbing interest. It is full of facts, indeed, but these facts have been selected by a historian with a sense of what is important. Certain conclusions are directly drawn for the reader, others are no less clear and suggestive because they remain implicit. The style is dry, but it flows so easily that the summons of the dinner gong is answered with reluctance; it is to be hoped that Mr. Fremantle will soon give us the second volume, which he promises conditionally on the present one receiving " a favourable verdict from the public."

The England of which he writes was parent of a generation that is more familiar to us through literature than any other in our history. In 1830, just a hundred years ago, Captain Marryatt was thirty-eight, Surtees twenty-eight, Disraeli twenty-six, Thackeray nineteen, Dickens eighteen, Trollope fifteen, and George Eliot ten. If she had lived, Jane Austen would only have been fifty-five. At any rate, the picture we have of that vital, inconsistent age is incomparable. And yet it is not altogether " a good likeness," so to speak, though Disraeli with his "Sybil" tried hard to make it fairly literal.

There developed in the early stages of the Industrial Revolution the social diversity which was perhaps the inevitable hard lot of the pioneer country. From that day to this there has been a greater emphasis on the differences between all sections of the community in England than on what they have in common. Our humanists comment with envy on the comparative geniality of life in France; three quarters of a century ago Thackeray, in his *Paris Sketches*, had anticipated all observations of the sort. Mr. Fremantle does not say too much about "British freedom," but he is bound to mention the pride which its possessors took in it—to console themselves, no doubt, for the lack of more positive blessings. Speaking of the French, Thackeray wrote: " If to our freedom we could but add a little of their happiness! "

Faith in " laws " of economics played the sinister part at the beginning of the nineteenth century which faith in " laws " of progress played at the end. Happily, the energy and determination which precipitated so much misery were only one expression of a national vitality that sought and found less grim outlets than commercial competition. Machinery had not yet squeezed the colour out of public life. Statesmen and national heroes were not yet affecting that conformity to dowdy standards of decorum which became the rule later on. Was Nelson a model of virtue—or even so much as a conventional old Sea Dog? Not he. His temperamental private life would have sat as well on a poet, and he was, of all things, a hypochondriac for " what he thought were mortal heart attacks were only spasms caused by indigestion."

Mr. Fremantle does not begin his book without introducing the subject adequately; indeed, before he sets out to describe the events of the years 1801-1805 in detail he gives us two hundred pages on the state of affairs at the close of the eighteenth century. At the end we find not only an index but a very full bibliography, and also a most useful selection of references.

In spite of all that has happened since those days, our own age and the age of Pitt, Wellington and Grey, have a certain clear affinity. Mr. Fremantle shows us a generation animated, like our own, by a sense of impending mastery and preoccupied far more with means than with ends. At least hard work was apt to be recompensed better a hundred and twenty-five years ago than it is to-day: there was more elbow-room and less waste of ability. It is always possible that the general recognition of this waste will be one of the factors making for a more philosophical régime in the not too remote future.

MEETINGS OF THE SOCIETY AFTER CHRISTMAS

Ordinary Meetings

Wednesday evenings, at 8 o'clock (unless otherwise announced).

January 8.—Shaw Desmond, "The Novel—What it is and what it is not." P Morley Horder, F.S.A., will preside.

January 15.—Joseph Burton, A.R.C.Sc.I., of Pilkington's Tile and Pottery Company, Ltd., "Quality in Pottery." Professor H. E. Armstrong, Ph.D., LL.D., D.Sc., F.R.S., will preside.

January 22.—Gilbert Stone, Barrister-at-Law, Legal Consultant to the Advisory Council on Minerals of the Imperial Institute, "Observations on the Mining Laws of the British Empire." Sir Richard A. S. Redmayne, K.C.B., M.Sc., M.Inst.C.E., will preside.

January 29.—Sir Thomas Holland, K.C.S.I., K.C.I.E., D.Sc., F.R.S., Principal and Vice-Chancellor of Edinburgh University, "The International Bearing of Mineral Products." (Trueman Wood Lecture).

February 5.—Sir William Clare Lees, O.B.E. (British Economic Mission to South America), "Some Aspects of the Question of Trade with South America." Sir Edward T. F. Crowe, C.M.G., Comptroller General, Department of Overseas Trade, will preside.

February 12.—Holbrook Jackson, Editorial Director of "The Drapers' Organiser," "Colour Determination in the Fashion Trades." The Right Hon. Lord Ebury, D.S.O., M.C., Chairman, Army and Navy Co-operative Society, will preside.

February 19.—"Alfred Stevens, Architect, Sculptor, Painter."

February 26.—Professor F. A. E. Crew, M.D., D.Sc., Ph.D., Director, Animal Breeding Research Department, University of Edinburgh, "Genetical Methods of Live Stock Improvement."

March 5.—Professor Arthur R. Ling, M.Sc., F.I.C., School of Malting and Brewing, University of Birmingham, "Brewing as a Branch of Science." Sir William Waters Butler, Bt., F.C.S., Past-President of the Institute of Brewing, will preside.

March 12.—Professor G. Elliot Smith, M.D., F.R.S., "The Human Brain."

March 19.—Mrs. Katherine B. Esdaile, "The Portrait in Nature, Monumental Sculpture."

March 26.—Howard Robertson, F.R.I.B.A., Principal of the Architectural Association Schools. "Architecture of To-day and To-morrow.

April 2.—Nathaniel Lloyd, O.B.E., F.S.A., "Building Craftmanship."

April 30.—Rev. Percy Dearmer, D.D.

May 7.—S. K. Ratcliffe, "National Parks."

May 14.—H. Granville-Barker, "A National Theatre."

May 28.—"The Bi-centenary of Wedgwood." Major Frank Wedgwood will preside.

INDIAN SECTION.

Friday afternoons at 4.30 o'clock.

JANUARY 10.—SIR BASIL P. BLACKETT, K.C.B., K.C.S.I., "The Economic Progress of India." The Marquess of Reading, G.C.B., G.C.S.I., G.C.I.E. G.C.V.O., will preside.

FEBRUARY 7.—G. H. TIPPER, "Recent Mineral Development in India."

MARCH 7.—

APRIL 4.—LIEUT.-COLONEL SIR WOLSELEY HAIG, K.C.I.E., C.S.I., "The Maratha Nation." (Sir George Birdwood Memorial Lecture).

MAY 9.—DAVID CLOUSTON, C.I.E., M.A., D.Sc., "The Report of the Royal Commission on Indian Agriculture."

DOMINIONS AND COLONIES SECTION.

Tuesday afternoons at 4.30 o'clock.

JANUARY 28.—SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., "Settlers' Problems in Kenya."

FEBRUARY 25.—

MARCH 25.—O. J. R. HOWARTH, O.B.E., M.A., Secretary, British Association for the Advancement of Science, "The Work of the British Association in Relation to the Empire."

APRIL 29.—

CANTOR LECTURES.

Monday evenings at 8 o'clock.

HAROLD WRIGHT (of Messrs. P. & D. Colnaghi & Co.), "Three Master Etchers: Rembrandt, Meryon, Whistler." Three Lectures. January 20 and 27, February 3.

> LECTURE I.—THE ETCHINGS OF REMBRANDT VAN RIJN, 1606-1669. Rembrandt's predecessors in etching. His earliest etchings. Etchings of beggars. The illustrations of Biblical subjects. The Landscapes. The portrait etchings. Influence of Rembrandt's work on subsequent etchers. Tributes to Rembrandt's genius as an etcher.
>
> LECTURE II.—THE ETCHINGS OF CHARLES MERYON, 1821-1868. Meryon's parentage. His youthful voyage to the South Seas. Return to Europe. Initiation into painting and etching. Etchings after Zeeman. The Paris etchings. The Bourges and South Seas plates. The Portraits and other commissioned plates. Meryon as a Social Reformer and Poet. His death. Some tributes to his genius.
>
> LECTURE III.—THE ETCHINGS OF JAMES MCNEILL WHISTLER, 1834-1903. His student days. Etchings of Alsace and Paris. He comes to London. The Thames series. The Portraits and Landscapes in drypoint. The Transition Period. The First Venetian series. The second Venetian series. The Cameos. The Etchings of Touraine, Paris, Brussels and the Netherlands. Whistler's influence on the revival of etching. Some tributes to his genius.

ALFRED B. SEARLE, "Recent Improvements in Methods of Brickmaking." Three Lectures. February 17 and 24, March 3.

> LECTURE I.—Bricks still the most pleasing of artificial building materials; some reasons for this. Hand-moulded bricks the most beautiful but too costly

and too difficult to produce for many modern requirements. Enormous quantities now needed yearly necessitate mechanical methods of production from many kinds of materials.

Modern methods for making bricks of plastic or potentially plastic clays. Plain Bricks. Rustic Bricks.

Lecture II.—Methods for making bricks of clay, shales, and other slightly plastic materials. The Stiff-plastic Process. The Semi-dry Process. The Tunnel Kiln and its effect on Brickworks Design. Multi-coloured Bricks.

Lecture III.—Methods of making bricks of non-plastic materials. Sand-lime Bricks. Slag Bricks. Clinker Bricks. Bricks from Colliery Tips. Cement or Concrete Bricks. Silica Firebricks. Magnesite Bricks. Zirconia Bricks. Sillimanite and allied Bricks. Conclusion.

Commander F. G. Cooper, R.D., R.N.R., " Aids to Navigation." Three Lectures. March 24 and 31, April 7.

Lecture I.—The Mariner's Compass in various forms. The Marine Chronometer. The Pelorus and Bearing Plates. Parallel Rulers and Protractors. The Station Pointer. The Sextant and Quadrant. Dividers. The Range Finder.

Lecture II.—Sounding Machines and Echo Sounding. W.D. Finder. Submarine Sound Signals. Whistles and Syrens. Barometers and Thermometers. The Baro-Cyclonometer (Algue's). Telescopes and Binoculars.

Lecture III.—Clear View Screen. Patent Logs. Chernikeeff Log. Navigation in Fog. Leader Cable. Janus System of Signalling. Bell Buoys, etc. Star Charts and Globes. Tide Charts. Nautical Tables and Books. Noctovisor (Professor Baird's).

Dr. Mann Juvenile Lectures.

Captain C. W. R. Knight, M.C., F.R.P.S., F.Z.S. Two Lectures. Monday, December 30, at 3 o'clock, and Wednesday, January 1, at 3 o'clock. Illustrated by Cinematograph Films.

Lecture I.—" The Golden Eagle."

Lecture II.—" Wild Life in the Treetops."

(Special tickets are required for these lectures).

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

◆

Monday, December 30..Architects, Royal Institute of British, 9 Conduit Street, W. 3.30 p.m. The Hon. Humphrey Pakington, " English Architecture. Lecture I—How it Began." (Juvenile Lecture).

Tuesday, December 31..Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr S. R. K. Glanville, " How Things were done in Ancient Egypt Lecture II—Making at Home."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W C. 5.45 p.m. Informal Meeting. Mr. T. E Thomas, " Papers and Discussions."

Wednesday, January 1..Architects, Royal Institute of British, 9 Conduit Street, W. 3.30 p.m. The Hon. Humphrey Pakington, " English Architecture. Lecture II—How it Grew." (Juvenile Lecture).

Thursday, January 2..Auctioneers' and Estate Agents' Institute of the United Kingdom, 29 Lincoln's Inn Fields, W.C. 7.30 p m Mr. A. Hollis, " Modern Progress—its Relation to True Value."

Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr. S. R. K. Glanville, " How Things were done in Ancient Egypt. Lecture III—Building in Stone."

Friday, January 3..Architects, Royal Institute of British, 9 Conduit Street, W. 3.30 p.m. The Hon. Humphrey Pakington, " English Architecture. Lecture III—What it Means." (Juvenile Lecture).

Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Mr. F. T. Woods, " Speedy Draughtsmanship."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Eng. Vice-Admiral R. W. Skelton, " Progress in Marine Engineering." (Thomas Lowe Gray Lecture)

Saturday, January 4. Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr. S. R. K. Glanville, " How Things were done in Ancient Egypt. Lecture IV—Boats and Furniture "

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4024 *FRIDAY, JANUARY 3rd, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NOTICE

NEXT WEEK

WEDNESDAY, JANUARY 8th, at 8 p.m. (Ordinary Meeting). SHAW DESMOND, "The Novel What it is and what it is not." P. MORLEY HORDER, F.S.A., will preside.

FRIDAY, JANUARY 10th, at 4.30 p.m. (Indian Section). SIR BASIL P. BLACKETT, K.C.B., K.C.S.I., "The Economic Progress of India." THE MARQUESS OF READING, P.C., G.C.B., G.C.S.I., G.C.I.E., G.C.V.O., will preside. Tea will be served in the library from 4 o'clock.

CURRENT NOTES

The Prime Minister allowed the Royal Society of Arts to print the following in their West Wycombe appeal booklet:—

> "To those who live in the country, and to the vast multitude of town dwellers for whom the development of modern transport has brought its remote recesses within reach, it is of vital importance that its beauties should be preserved. These beauties are threatened with desecration of various kinds, due sometimes to individual and sometimes to commercial thoughtlessness. It is essential, therefore, that public opinion should be mobilised in their defence, and those who are working to that end have my whole-hearted support."

He has since expressed his growing anxiety that despite the innumerable Societies for preserving every phase of the Beauty of England, there seems very little improvement. Our towns and villages seem to grow increasingly untidy, and the educated public mind despairs of any improvement. Mr. Peach's address on "Disfiguring advertisements" and the discussion that followed seem to have aroused the business man. Sir Herbert Morgan appeals for co-ordination of forces in the *Daily Telegraph*, and calls on the Royal Academy to fill the rôle of amalgamator. The President of the Academy definitely declines to consider this suggestion as feasible. The correspondence is proceeding day by day and includes contributions from Mr. Baldwin (who has been so helpful to the Royal Society of Arts in the work they have been doing), Mr. Lloyd George, and others. Many people feel that the time has come for amalgamating the energies of all the Societies into one Royal Society for the purpose of educating public opinion and resisting with real authority all attempts to destroy any landscape by unnecessary ugliness, or any building of historic or traditional character. The activities of the Royal Society of Arts for one hundred and seventy-six years have been so varied that it would appear to have all the equipment for the necessary co-ordination of all the forces of education. As Sir Henry Trueman Wood says in his admirable "History of the Society":—

> "At one moment the Society is endeavouring to further the improvement of labourers' cottages, at another it is proposing a reform in the standard pitch of musical instruments. It encourages with equal energy the planting of osiers for basket-making, the development of the fish supply of London, and the introduction of the Dutch system of curing herrings, the use of machines for sweeping chimneys in substitution for boy chimney-sweeps, the introduction of artistic designs in household crockery, and the placing of memorial tablets on London houses connected in the past with eminent men."

A conference might well be held in their historic and beautiful rooms, to consider how far, with the aid of the National Trust, "A Royal Society of England" might be formed.

The *Advertisers' Weekly* takes Mr. Peach seriously to task. Mr. F. G. Sayer, of Messrs. Nash and Hull, Ltd., evidently sees a red light:—

> "Yet I would suggest to Mr. Peach that by his method of attack he is likely to do more harm than good to the cause he has so much at heart. Far better that he and his Council should first acknowledge the fundamental fact that in these days of keen competition, advertising of all kinds, be it by Press, poster or wayside sign, is an essential part of the equipment of the successful business man, and so long as the results warrant an expenditure he will continue to use every means of publicity available to him, and to the large advertiser."

Will local authorities take note of this determination? They have the power to prevent Mr. Sayer and his kind from shouting his customer's wares across the peaceful fields of England, and we are convinced that a more persuasive form of advertising will be adopted by the great firms when they realise how such methods outrage the decencies. We refuse to believe that such methods will remain as the necessary equipment of the best business. A sign of the times is the very beautifully printed disclaimer by the Shell-Mex in the *Journal of the Design and Industries' Association*. Mr. Selfridge has shown how advertising with brains can illuminate and emphasize the lines of his building and not destroy its values.

The Society has now heard that the Urban and Rural authorities have agreed to a drainage scheme for the village of West Wycombe. This will enable the work here to proceed early in the New Year.

The Chairman's Inaugural Address on "Fifty Years of Electrical Science and Industry" has been widely noticed in Technical Journals as well as in the Daily Press. Mr. A. M. Green's very interesting paper on "The Cinema in India" has also attracted a good deal of attention, and a considerable part of it has been reprinted in *Public Opinion*.

We would direct the attention of Fellows to the interesting and varied list of lectures for the coming Season printed on pages 217-219, below.

PROCEEDINGS OF THE SOCIETY

CANTOR LECTURES

WIND INSTRUMENTS FROM MUSICAL AND SCIENTIFIC ASPECTS

By E. G. Richardson, B.A., Ph.D., D.Sc.,

Lecturer in Physics, University College, London

Lecture I.—*Delivered November 18th*, 1929

There are still many people to whom Helmholtz' "Sensations of Tone" is the last word in the application of the science of acoustics to music and musical instruments. There are others who, though well-versed in the classical treatise of the late Lord Rayleigh on the more academic side of the subject, are yet unaware of the contributions which the organ builder and wind-instrument manufacturer have brought to the perfection of these instruments. It shall be my endeavour to put before you in these lectures both aspects of this question, to attempt a *rapprochement* between musician, instrument maker and physicist. If I can show the former that the work done in the laboratory can add to the perfection of his instrument, and to the latter that the construction of wind instruments presents interesting problems for research, my object will have been accomplished.

The development of wind instruments from their very beginnings may be followed out even now in the sound-producing apparatus of primitive peoples. However savage a race may be, some form of drum and some form of whistle will be found among its tribal equipment. The genesis of such an instrument is a reed cut from the living plant with the pith removed, or a straw. On stopping one end with the finger tip, and blowing across the other open end, a sound is produced in the same fashion as one can excite the vibrations of the air in a door key. As these reeds are rather frail, especially if long, the next stage is to make an artificial pipe by hollowing out a piece of wood or even moulding a pipe of baked clay. Sometimes the leg-bone of an animal was used, hence the name *tibia*, used by the Romans. Clay soon came to be employed for stopping the ends of the pipes in place of the fingers. As such, this pipe was scarcely a musical instrument, but the ingenuity of man soon allowed him to play a succession of different notes by tying together a number of such pipes of graded length, so that the breath could play upon each in turn or in any desired order, the whole instrument being moved across the mouth as in playing the modern mouth-organ. This instrument, the Pan-pipes (or *Syrinx*) (Fig. 1), is of great importance as the earliest type of instrument able to produce a musical scale, and the reference to Jubal as " the father of all such as handle the harp and the organ," is generally taken as indicating this instrument. Early organs were, in fact, little more than a portable form of pan-pipes blown by bellows.

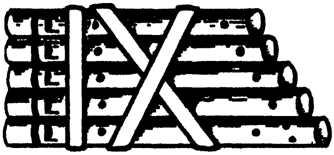

FIG 1

Forming the lips to direct the air across the open end of the tube, entails a certain amount of practice and fatigue, however, and attempts were made to help the player in this respect. Certain flutes have come down to us in which the open end had a nick cut out of it on one side to facilitate the forming of the correct "embouchure " on the part of the player. The latter had his task considerably lightened when the whistle form of mouthpiece was introduced. We can see the development of such a mouthpiece in the flute made by the native races of North America, where the whistle is external to the pipe itself. A notch is cut out of the pipe near one end and a little wooden box placed over it in such a way that air emerging from an aperture between the box and the pipe is driven across the notch towards its opposite edge. Another hole is made in the pipe to let the air into the box, while a plug prevents the player's breath, which now comes from between his lips gripping the end of the pipe, from passing directly up the pipe itself.

Other ancient forms of whistle were very similar to the modern flue pipe of the organ, the plug only partially blocking the pipe, leaving a narrow chink through which the air is driven across the mouth-hole.

The first true organ, a description of which has come down to us, was made by Ctesibius of Alexandria in 258 B.C., and was called the *hydraulus* or water-organ. The function of the water in this organ is a little uncertain. The pipes were not immersed in water—and pipes can be " blown " by water under water—nor was the wind pressure produced by hydraulic means. It appears from the descriptions that the water was used to stabilise and regulate the pressure of the air on a principle somewhat like that of the gasometer. Later specimens of hydraulus were provided with some sort of keyboard, the keys letting the wind into the appropriate pipes when pressed by the hand and returning by the action of springs when released. In the fourth century we have a description in Greek, attributed to Julian the

Apostate, of an organ, as follows :—" Here is an instrument of a type very different to that with which we are familiar. This instrument gives out piercing sounds without the aid of the human breath. Air which is shot out of a prison made of bull's skin penetrates the cavity of polished tubes, exciting the latter ; at the same time a nimble player actuates his fingers over contacts which correspond to the pipes, and at once the latter, sensible to the pressure of the air, give out a ravishing melody."

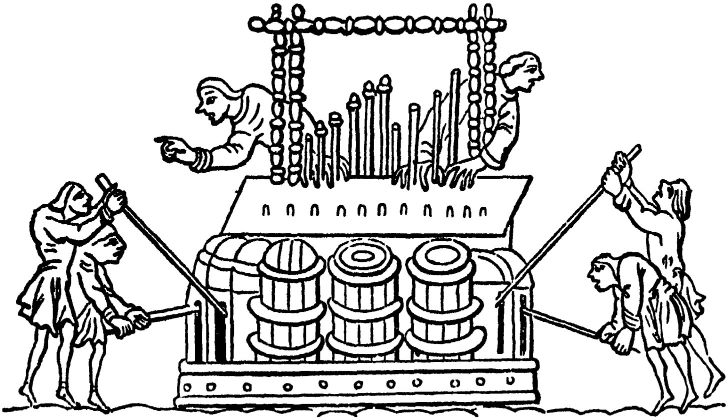

FIG. 2

In England, the early examples were called *portatives*, being in fact of dimensions suitable for carriage by hand with a small manually operated bellows at the back. Later, stationary instruments were constructed, the large bellows being worked by assistants with the hands or the feet. Fig. 2 (from a manuscript at Trinity College, Cambridge), shows one worked by two organists and four blowers. Organists who have suffered from the laziness of human blowers will, no doubt, sympathise with the appealing gestures of the two organists.

Time does not permit me to follow out the development of the organ further, as later improvements were concerned mainly with the blowing apparatus and action, and the change made in the sound-producing parts has been in matters of detail only.

Following closely on the heels of the pan-pipe, we have the invention of the reed pipe. Take a little piece of straw and partially slit it in a longitudinal direction ; place it in the mouth so as to grip the fixed end with the lips and you have a new sound-producing instrument ; the vibrating reed or pair of reeds, if both sections of straw are free to vibrate. The sound so produced is of feeble intensity, but man found that he could fit this into a " resonator "—a wider straw or pipe—and produce loud notes from the system formed of the vibrating reed coupled to the vibrating column of air in the pipe.

The next stage in the history of these wind instruments was the boring of holes in the side of the pipe. Owing to the need of supporting the instrument, it was not found feasible to employ more than six holes, three to be covered by the first three fingers of each hand, with possibly a thumb hole at the back. If these holes are all covered, we have the note of the complete column of air of the pipe. Uncovering the holes successively, starting with that farthest from the mouth, we get a series of notes of rising pitch. Much ink has been spilt on the significance of the positions of these holes for the formation of a musical scale by the ancients and by present-day primitive peoples, but at the risk of falling foul with the opinion of some eminent ethnologists, I shall venture to suggest that the positions for these holes were quite fortuitous, or, at the most, dictated by considerations of symmetry and convenience, not by any pre-conceived notion of a musical scale. The Red Indians form the lateral holes by burning them out with a hot stick, the positions being determined by measurements with the breadth of one or more fingers. If the savage finds it more convenient to place the holes for the right hand further down so as to avoid interlocking the movements of the hands, he does so, and then we find the holes grouped in two sets of three. Fig. 3 shows a flute of the two-group type arranged to be held vertically and blown across the open end; together with one with equidistant holes to be held horizontally and to be blown across an *ad hoc* mouth hole. All sorts of variations in the spacing in each group, and in the distance of the first and last holes from the ends of the pipe, have been found. I am aware, of course, that the ancient Greeks had theories of the musical scale, but doubt whether these theories were ever adequately put into practice. The difficulty of making a wind instrument in true intonation to any musical scale at the present day with modern perfection of apparatus is great enough, and it must have been impossible—except by sheer luck—to approach such a standard with the means available at that time.

Another primitive instrument having holes to uncover for varying the pitch has transmitted a descendant down to our own times in the toy instrument called *ocarina*. This employs the resonator as opposed to the pipe principle. It is a well known fact that a hollow cavity of air, communicating with the atmosphere through a hole or neck, has a natural pitch of note depending on the size of the cavity

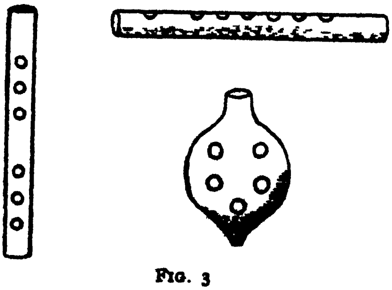

FIG. 3

and the neck, and may be excited by blowing into the resonator, or across the neck in flute fashion. The sounds heard when a sea-shell is put near the ear are produced in this fashion. Such resonators are fixed beneath instruments of graduated laths of wood (*xylophones*) hit with a hammer, for re-inforcing the tone. Some good aboriginal specimens of xylophones with gourds as resonators may be seen in the museum at Aylesbury, Bucks. But I must return from this diversion to the instruments of the ocarina class, one of which is drawn in Fig. 3. The pitch of the resonator may be raised by widening the orifice of the neck, or, what comes to the same thing, opening other holes in the side of the shell. Unlike the pipe the positions of these holes is immaterial, it is their size that counts: the fingering is consequently very different from that in any other wind instrument. These were blown by a current of air directed across the mouth of the resonator. The modern ocarina is provided with a whistle mouthpiece. We may remark that resonators have been employed in the shape of inverted bottles—actual bottles in some cases—as flue pipes on organs, where economy of space was a consideration. Locomotive sirens are generally of this type.

There remain two varieties of reed pipe, now obsolete, which merit attention before we trace the evolution of present-day survivals. One of these is shown in Fig. 4 and is known as the pibcorn or hornpipe. This is now a very rare instrument.

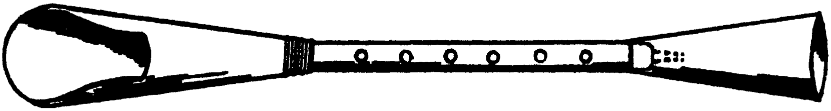

FIG 4

The one shown is a product of Anglesey, and is the property of the London Society of Antiquaries. Its speciality, apart from a peculiar shaped " bell " attached to the lower end of the pipe, is a hood surrounding a beating reed of cane (shown by dotted lines) which fits over the player's mouth. The player blows into this cavity—which reminds one of the "boot" of a reed organ pipe—and his lips do not touch the reed. The pipe itself, with six finger holes, and one thumb hole behind, is of wood, while both hood and bell are of horn.

The other reed pipe is not a true reed pipe at all since the place of the reed is taken by a vibrating membrane. The pipe, which has no side holes, serves merely to re-inforce the vibrations imposed upon the membrane. This was called the eunuch pipe or *mirliton*, and the vibrations of the membrane were obtained by humming into a mouth-piece enclosing it, or—a curious method—by pressing the membrane against the outside of the throat while humming! The *kazoo* is an instrument now sometimes found in toyshops of very different size and shape to the eunuch pipe, but in which the " music " is produced by humming into a mouth piece across which a membrane is stretched.

Let us now trace the development of the flute from the middle ages. Although we inevitably associate the troubadour with the guitar, yet the wind instrument was not scorned by minstrels, and we know that the " pipe and tabor " was an essential feature of rustic merry-making. The " pipe " in question was usually a member of the flageolet family. These, the ancestors of the penny tin whistle—though I doubt whether you would get one for a penny nowadays—had a short open cylindrical pipe provided with a whistle mouthpiece having a chamfered under surface to fit into the mouth. A flute having this " beak " mouthpiece became known as "*flute à bec*" or fipple flute, from the German *föppl.* It became very popular in England and developed into the *recorder* often mentioned by Shakespeare, and got the name of English flute ; I believe that the flageolet is still known in France as *flute anglais*. Sometimes two or even three of them were connected to the same breath inlet, so that it became possible to play two parts at a time, or to use the unvaried tone of the one as a *basso ostinato* to a melody played on the other, as with the drone of a bagpipe.

It is difficult to realise now the important position which the recorder occupied in the life of Elizabethan England. It is frequently mentioned in Shakespeare ; thus in Midsummer Night's Dream : " He hath played on his prologue like a child on a recorder, in sound but not in government." Recorders are extant of all sizes, and made in all materials from wood to ivory, fashioned into walking sticks, etc. It was as common for people to gather together to play quartets upon these instruments, as to sing madrigals, and instruction books for the recorder were frequently printed. An average sized instrument would have a bore of three quarters of an inch and be about two and a half feet long, terminating in a slight expansion (Fig. 5 upper drawing) ; keys to act upon additional holes beyond those covered by the fingers were a later invention. It may surprise my hearers to know that quite a number of recorders are being now annually made to order by well-known firms, although the demand is not quite enough to justify their inclusion in catalogues as stock models. The tone of the recorder is mellow but soft and would scarcely get through the mass of tone of a large orchestra, but as the player has the embouchure already formed for him, he can give all his attention to fingering. This makes it a useful instrument for an amateur wishful to take part in chamber music.

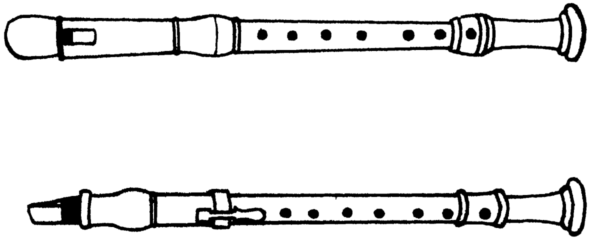

FIG. 5

At the same time that the flute à bec was being evolved, the other form, in which the mouthpiece was a hole in the side across which the player's breath was directed, continued in use, especially on the Continent. In Shakespeare's "wry-necked fife" he is probably referring to the necessity for twisting the head to the left in playing. This was called the transverse flute, cross flute or German flute, although Switzerland was the country to which it owed its development. The fife had a cylindrical tube For reasons which I shall give in the third lecture it is difficult to produce the fundamental pitch of a very long narrow pipe, but if the bore be made wider, at least near the middle, it is possible to do this, and therefore to construct a flute having a lower range. On the flute of which I am now speaking the bore tapered from the mouth hole to the far end, a device which secured this effect, and remained the fashion till recently.

These two flutes remained in competition for many years, until the superior control over the tone which the transverse flute gives the player by letting him form his own embouchure caused this flute to outstrip its rival, so that the whistle mouthpiece has now left the orchestra for good, though, of course, it forms the foundation work of the organ. The flute à bec disappeared from regular use at about 1750.

Turning now to instruments having reeds we note the introduction of the *shawm* in the twelfth century. This had a double reed rather thick and wide, leading into a conical tube of rather large angle, and it flourished up to the seventeenth century. It was provided with seven holes of which the lowest was often bored double. The sharpening of tone produced by opening a side hole in a pipe depends on the size of the hole, the sharpening being greater as the width of the hole increases. The double-hole device therefore constituted a means of obtaining a semi-tone between the note of the whole tube and the note of the same with a large hole open, as the player might uncover only one member of the pair if he wished. The same principle was used on single-holed instruments when the player half uncovered one of the single holes. Additional holes, "tuning holes," were sometimes bored in the bell. These were not covered by the fingers, but served to determine the lowest note of the instrument when all the practicable holes were shut; a proceeding which made the bell little more than an ornament. This instrument grew shorter, was given a finer bore and reeds, which made it easier to handle and increased its range of pitch; and so it became the *hautboy*, now *oboe*. In 1674 the French composer Lully introduced this into the orchestra to play with the violins in his opera "Alceste." At that time it was the fashion of hautboy players to blow with all their might, bringing forth a raucous quack—hence the verb *canarder* applied to this style of playing—which could not have blended very pleasantly with the strings. Once the true mode of playing the oboe with bated breath had been discovered, the same construction was utilised to build double-reed instruments of deeper pitch, which gradually displaced the shawm. The *oboe d'amore*, the *cor anglais*, the *bassoon* and the *contra-bassoon* in order of descending pitch followed close on its heels. The first of these (a third below the oboe) has fallen into disuse in the orchestra, but is demanded by Strauss for his Symphonia Domestica. The cor anglais (a fifth below the oboe) is still an occasional feature of the orchestra ; both these have bells of a peculiar bulbous shape. The bassoon lies at two octaves below, and the contra-bassoon at three. In these instruments there is a considerable length of upper tube near the reed which is uninterrupted by side holes. The practice grew up of making this part from a thin metal tube stepped at one end into the wooden part of the bore, and at the other forming a staple for the reed. Even when this part of the pipe was curled round upon itself the player could not reach the necessary holes with his fingers, so that the wider part of the tube had to be doubled upon itself several times before the invention of keys. Even now, with keys, the bassoons have the tube folded into two parallel portions joined at their lower ends, to economise space. The resemblance of the instrument in this form to a bundle of fagots is the probable origin of the name it received in Germany and Italy (*Fagott* , *Fagotto*).

This craze for bending back a long tube was sometimes carried to an absurd excess. The obsolete German double-reed *rackett* shown in Fig. 6 was provided with a cylindrical tube of narrow bore which was wound back upon itself no fewer than nine times inside the ivory box which forms the body of the instrument, and in which the finger holes can be seen. In this shape the extreme range of pitch was to low D, and yet the whole apparatus stood only a foot high.

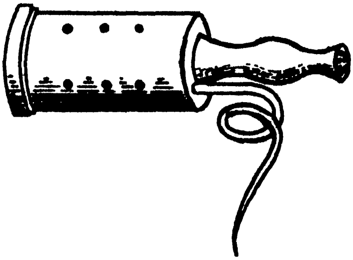

Fig. 6

The single beating reed seems to be of later origin than the double reed ; at any rate it did not find a place in the orchestra till a later date. The ancestor of the modern clarinet was the *chalumeau* (Lat. *calamus*, a reed) a name which is still used to denote the lower register of the clarinet. The chalumeau is shown in the lower drawing of Fig. 5. The beak which holds the reed is remarkably like its modern counterpart, but it was held the other way up, with the reed above, gripped by the top teeth.

At this stage it is appropriate that I talk of the introduction of keys, the little levers pivoted near their centres, through the medium of which holes not directly covered by the fingers can be opened or closed. Before their introduction there were extra holes on some instruments, which could be permanently opened or shut by rings before the commencement of play. It seems that keys were first adapted to the instruments that I have described in order to extend the compass downwards, by providing a hole or holes beyond the normal seven. These were open unless the appropriate keys were pressed by the little finger of the right hand. When this, and all the other holes were closed by the remaining fingers the lowest note was obtained. As this key mechanism was fragile it was common to slip a little barrel round it, when the instrument was not in use. Such barrel slides may be seen on extant examples of shawms. The key was also used on holes lying between members of the main series, not this time for making holes available beyond the stretch of the hands, but to provide semi tones in between the other note holes. These holes would be normally closed by their keys, until pressed by the fingers. Before this, intermediate semi-tones were producible only by the trick I have already mentioned of half covering a hole, or by what was known as "cross-fingering," which consists in closing a hole further down the series than the one which would produce a lowering of a whole tone. Thus, if this arrangement of shut and open holes ●●●○○○ gives G, then ●●●● may give F, but ●●●○●○ will probably give F sharp. It was on the "one keyed flute" (the key operating a D sharp) that most of the flautists before 1800 had to perform their parts; all "accidentals" other than the D sharp being obtained by such stunt fingering, in more or less correct intonation. It was this flute which was the subject of Cherubini's famous jibe that two flutes in an orchestra were worse than one. That flautists had no mean opinion of the capabilities of themselves and their instruments is evidenced by the fact that one player of note proposed E flat as an extra key, as if the D sharp already existing—and remember that there were no other keys to the flute—were not enough.

The method of obtaining the sounds of a pipe by blowing through the compressed lips appears to represent an earlier stage in the history of our subject matter than the whistle or the reed. The earlier horns were literally the horns of animals, elephants' tusks, etc. and were unprovided with a mouthpiece, so that the player had to press the small end of the horn over his lips. Most of the civilised ancient races possessed horns in metal, the large *tuba* of the Romans being one of the best examples of this class. This was played with a mouthpiece and with distended cheeks which made it necessary to wear a bandage to withstand the strain upon the cheeks. These horns were probably used only for giving signals, especially in war, and not for performance of music, as neither the extreme lower nor upper harmonics could be produced. The subsequent history of the horn in the middle ages is characterised by an increasing daily use in hunting, in processions and all ceremonial occasions.

A distinction is made nowadays between horns and trumpets. The difference is mainly in the shape of the tube. The horn tube is a cone, opening out gradually from the mouthpiece, and ending in a bell of large "flare." Whereas the trumpet has a cylindrical tube, or a cone of very small angle for the greater part of its length, ending in a bell of moderate expansion. In the early days this distinction was not made, and it is very difficult to sort out the two families from many of the references which have come down to us.

It was not long before attempts were made to put the horn on an equal footing with the flute and shawm with regard to the number of notes available. The first device tried was merely an extension of the length of the instrument. From a simple undivided tube one can elicit only the harmonic series of tones based on the fundamental tone corresponding to the full length of the tube. Higher up in the harmonic series, these tones approach closer together, and in one region cover most of the notes which a simple melody would require. To get this region down to a reasonable pitch, the fundamental must be pushed low down in the musical gamut, hence the necessity for a long tube, which was sometimes coiled round the shoulders of the performer for convenience in carrying. As this idea was unsatisfactory in many ways, the next expedient was an attempt to foist upon the " brass " the side holes of the wood-wind. The *cornett* was a simple form of this instrument. It consisted of a *wooden* tube of moderate expanding bore and two to three feet long; yet provided, as it was, with a shallow cupped mouthpiece, it must be classed with the brass family, and with the trumpet rather than the horn branch. The important feature of the cornett was that it was provided with the seven finger holes of the shawms and recorders. As might be expected, its timbre resembles the latter rather than the true horn. In the seventeenth century there grew out of the cornett an adult form of the note-holed brass, which is shown in Fig. 7, and was called, for obvious reasons, the *serpent*.

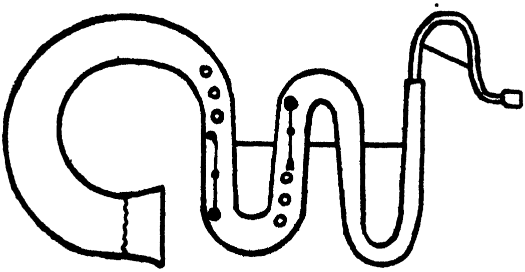

FIG 7

Beside the six holes for the fingers, a couple of keys will be noticed, and there are others at the back. The serpentine part of the instrument is of wood, the mouthpiece and leading-in tube of metal; the effective length of the tube is about 8 feet. For years this instrument formed the bass of the orchestra, and was specified by several noted composers up to the nineteenth century. The serpent parts in Mendelssohn's *St. Paul* and the overture to *A calm Sea and prosperous Voyage* are still occasionally played on the instrument for which they were scored, otherwise they are taken by the tuba. Those who have heard it played can well believe the Abbé Mersenne who said in the 17th century that one serpentist could easily overcome twenty of the strongest singers. At any rate, it had many uses, from the military band to the small orchestra which supported the church choir.

But beside the application of side holes to what were in effect wood-wind types blown with a " brass " mouthpiece, the late 18th century evolved an instrument on the same principle which bears more resemblance to the " brass " as we understand the term to-day. I refer to the extinct *key-bugle*. This was an almost exact counterpart of the present-day bugle, with the important exception that a number of side holes were added, *all* worked by keys normally in the closed position. Thus, the instrument behaved like an ordinary bugle, until one or other of the keys was brought into use, and then the harmonic series based on a fundamental of higher pitch than that of the complete tube was available. This led to bass instruments of the same type named *ophicleides* (Fig. 8) having a formidable array of keys, which, on the Continent at least, rivalled the serpent in popularity. The introduction of *pistons*, which heralded the modern brass, consigned these keyed brass monsters to oblivion, in the middle of the last century. They must have been difficult to keep in order, as a slight leak past one of the key-pads rendered the pitch liable to falter.

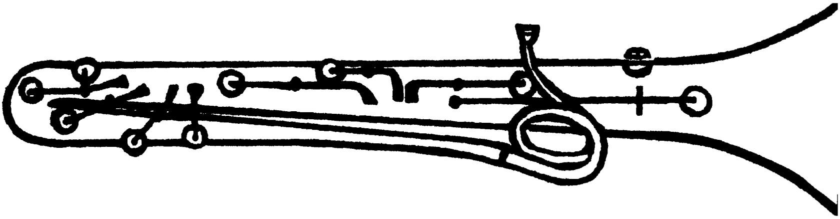

FIG. 8

The trumpet developed side by side with the horn, and little need be said further with regard to it; indeed it is difficult to specify under which heading the serpent and key-bugle should be classed. There is, however, one method of obtaining a variation of pitch, which was applied to the trumpet, the credit for whose invention cannot be ascribed with certainty, but which survives in the trombones. The tube of the trumpet was cut somewhere near the centre and the two parts joined together with a U-shaped crook, which could be pushed in or out of the rest of the tube, shortening or lengthening it at will. It seems probable that the first crooks were adjusted in fixed positions before playing a given piece, as are those of the modern French horn and cornet, but it could not have been long before instrumentalists realised that in the slide they had a means of varying the length of the tube from note to note, a far better way than to endeavour to pick out the note they desired from a harmonic series to which it may or may not have belonged. This form was called the *sackbut*, now the trombone. Of all instruments this has changed least in the course of centuries. Looking at a sackbut of the sixteenth century, at a casual glance we might readily mistake it for a trombone of the twentieth century. Its possibilities were, however, scarcely realised in earlier times, and it fell into disuse, at least as an orchestral instrument, until the last fifty years. It will rarely be found in the scores of Beethoven and Haydn.

This completes the short account of the evolution of wind instruments up to modern times, which the length of this lecture allows me. Those who are interested in obtaining further details on these matters should consult the books of F. W. Galpin and of U. Daubeny, which contain a large number of photographs of the instruments that I have been discussing.

The following instruments from the Collection of Canon F. W. Galpin were shown at the lecture :—Panpipes (Fig. 1), Vertical flutes (Arabian *Nay* and Chinese *Yo*) (Fig. 3), Nose flute (Fiji Islands), Double reed-pipe (Chinese *Pili*), Pair of pipes (Egyptian *Zimmarah*), Whistle flute (North American Indian), Recorder (Fig. 5), Chalumeau (Fig. 5), Shawm, Hautboy, Cornett, Serpent (Fig. 7), Key-bugle ; also a Pibcorn from the London Society of Antiquaries' Museum.

OBITUARY

EDWARD DENT.—The Society has lost a Fellow of very old standing by the death of Mr. Edward Dent, which took place at his residence in Carlos Place, W., on December 18th, at the age of 83. Mr. Dent was elected a Life Member in 1880. He took a deep interest in the activities of the Society ; on several occasions he presided at Ordinary Meetings and he frequently took part in the discussions. He served on the Council from 1916-19, and again as a Vice-President of the Society from 1920-23.

After being educated at Harrow and Trinity College, Cambridge, Mr. Dent became a partner with his brother, the late Sir Alfred Dent, in the well-known firm of East India merchants, which was founded by their father, Thomas Dent. They were together successful in obtaining the charter for the British North Borneo Company, of which Mr. Edward Dent became Vice-President. He had been for almost sixty years a director of the Sun Insurance Office, and he was also hairman and part founder of the London Cab-Shelters Fund. He was a Governor of St. George's Hospital, and served on the committees of St. Mark's Hospital and of the Belgrave Hospital for Children.

In addition to his commercial and philanthropic activities, he was keenly interested in various branches of science and archaeology, and had a sound knowledge of old silver, furniture and pictures. He was almost the senior member of the Court of the Grocers' Company, of which he was Master in 1890, and he was High Sheriff of Buckinghamshire in 1888.

NOTES ON BOOKS

THE MYSTERY OF THE DIVINING ROD SOLVED. EXPERIENCES OF AN AMATEUR DOWSER. By Ernest Christie. London : Campbell and Co., 19 and 20 Temple Chambers, E.C.4. Price 1*s*.

In a pleasant and not over-formal manner, without any traces of pedantry, self-assertiveness or boasting, Mr. Christie tells his story concisely in a booklet of 36 small octavo pages. This mode of presentation naturally leads to a more placid and undisturbed consideration of the subject than if the author had introduced himself in that growing spirit of the times which is characterised by extremes in claim and profession.

Mr. Christie, on p. 26 of the booklet under notice, says, "I cannot claim to have any scientific knowledge," but notwithstanding this modest disclaimer, we discover, by reading the next page, that he has such knowledge of natural philosophy or physical science as enables him to present and consider a leading theme of past ages and of our day, as bearing on the psychology and dialectics of his own subject. Thus, on p. 27, Mr. Christie aptly refers to the incompatible views that have been put forward as to the atom; Bôhr's structure and Schrödinger's concept coming last. In terming the various views "mere guesses," the author is acting in accord with the doctrine of "sufficient reason," as put forward so effectively by Leibnitz; no sound basis being found for accepting any one in a final or definite sense as against all the others. It may be well to set out with the position that the utmost reasonably to be expected from an investigator towards the solution of the mystery of the divining rod in its first aspect is to establish as a reasonable proposition or high probability, one clearly realised relativity of the phenomena as observed with anything which we can regard as absolute. In taking this as the basis of our criticism we will begin with Mr. Christie's conclusion as found on p. 36: "The power that moves the twig is life." The details of the booklet are devoted to showing how it may be reasonable to conclude that life is to be regarded as the fundamental or absolute which is always involved in any phenomena which may have been established; so to be quite verbally strict we should slightly qualify "is life": possibly by making it read "is a function of life" or "a condition in relativity with life." At any rate, the author's position is that he has established vitality in some form or aspect as essential. Life, Soul and Mind are subject to such overlaps in meaning when we attempt to define them as to remind us that we cannot, in our present state, know any absolute (or *ens*) except through speculation guided by the relativities or attributes: these we can either mistake or so misplace that a serious student may feel like Faust in the opening soliloquy of Goethe's great drama, hopelessly despairing when realising that he can know nothing with certainty.

In reading Mr. Christie's booklet, it will be noticed that on p. 3 it is estimated that about one person in twelve is sensitive to the postulated water-finding influence, under which the diviner has an impression as if energy originates in the twig itself, when the holder of the forked twig or divining rod wanders over lands where water forms spring-heads below. The author appears to favour the opinion that such energy as may be involved is connected with a kind of sympathy or psychic accord between the underground spring-head and the flow of the dowser's circulating medium under the pumping action of the heart; pp. 24, 28, 30.

The author's dictum, near the end of p. 28, "So the heart is a spring-head without a stream, as it were," makes us realise that an accepted terminology, such as may be established in due time, is desirable.

A biologist, having read so far, may incline his mind towards a consideration of the intercommunication among insects by such external organs as antennae, also to telepathy; but he will also consider the water-finding power of rats, also of the long root fibres of some plants, as, for example, holly. Homing instincts of cats and of birds will not be forgotten, but when the biologist goes near the bottom of the vital scale and considers the phagocyte in our circulatory system, he will thank of the amœboid phagocyte not only selecting his prey from a relatively considerable distance, but shaping into something comparable to a human hand during the combat.

CATALYTIC PROCESSES IN APPLIED CHEMISTRY. By T. P. Hilditch, D.Sc. (Lond.), F.I.C., Campbell Brown Professor of Industrial Chemistry in the University of Liverpool. London: Chapman & Hall, Ltd. 16*s*. net.

Recent investigations into the nature of the catalytic process have gone far in the direction of dispelling the "mystery" which used to be supposed to belong to the subject; and in the last four or five years several text-books have appeared in which these newer views are explained to a wide circle of readers. While, however, the observed facts of industrial catalysis must necessarily enter largely into any theoretical treatment, these works have not for the most part approached the subject from an essentially industrial point of view, and Professor Hilditch's book is therefore all the more welcome.

He begins with a survey of the general principles of catalysis, making the inevitable separation into homogeneous and heterogeneous divisions, but excluding enzyme action from the latter category and giving it a section to itself. There is considerable justification for this classification from the industrial standpoint, having regard to the great practical gulf between chemical and bacteriological methods of control. Incidentally, Dr. Hilditch expresses the interesting opinion that fermentation processes may have a great industrial future, and could probably be applied much more widely than they are at the present time. The low temperatures employed constitute, of course, their principal advantage.

The author departs from custom in dealing with the heterogeneous division first, not because it is so manifestly the more important industrially, but because he claims that, in view of recent work on adsorption and allied conditions, it has now come to be better understood than the other. Perhaps he is at his best in discussing the heterogeneous side, including the phenomena of poisoning; though the section on activation or promotion, owing to the present lack of any very convincing picture of what really happens, does not attain such a high level of interest. It may be remarked here that the index is not a strong point of the book: it was searched in vain for any reference to activation, promotion or stimulation.

In all branches of catalysis the author inclines to the view, which now appears more and more inevitable, that the catalyst plays a chemical part in the reactions, which proceed through the formation of temporary and unstable intermediate products. At first sight, it is true, the complete adoption of this view would seem to lead to difficulty in accepting the phenomenon of homogeneous negative catalysis, especially if one rejects (as the author appears to do in a chance reference on p. 10) the anti-catalytic explanation of Titoff; but other explanations are in fact possible, the best of which perhaps is that true negative catalysis occurs only in reactions in which long "chains" of activation are set up, the function of the negative catalyst being to interrupt such chains whenever its molecules encounter them

The practical portion of the book is devoted to a detailed consideration of the various catalytic industries at present in operation. The facts are fully and lucidly presented, the information includes much that is of very recent date, and the bibliographical matter is carefully selected. For greater ease in reference, excellent classified lists of processes and products have been compiled.

COUTTS'. THE HISTORY OF A BANKING HOUSE. By R. M. Robinson. London: John Murray. 15*s*.

So far from being involved in abstruse matters of finance by this book, the general reader will find it human and entertaining. If the general reader is a little philosophical, he will be led by it to meditating on the eternal dualism, not so much of human nature as of human society, which is not natural, but artificial. Think of old

Thomas Coutts, the soul of integrity, the embodiment of caution and practicality, a sort of Eminent Victorian who happened to live and die before Victoria came to the throne—think of old Thomas Coutts, lending thousands of pounds to extravagant princes and duchesses at a time when a poor man would be hanged for stealing a sheep; making money honestly and honourably by advancing loans to public servants who, as they owed debts and were paid their own salaries unpunctually, might have found themselves in gaol but for the intervention of the kind and shrewd Scotsman. Not, indeed, that prison for them would have entailed so much hardship; Coutts' client, Lord George Gordon, seems to have managed to entertain his friends pretty hospitably in Newgate.

Think again of old Thomas Coutts, first marrying the nurse-maid of his brother's household, and secondly a young actress of less than thirty when he himself was sixty-nine; showing an independent mind in private life, while in public life nothing either more or less than the correct thing was tolerable to him; his daughters' marriages, if not his own, were to be "alliances." Alliances they turned out to be, though Sophia's marriage to Francis Burdett had at first some awkward consequences. However, their daughter Angela, afterwards the Baroness Burdett-Coutts, lived long enough to justify by her philanthropy what had looked, at the dreadful moment when George III withdrew his patronage from the Coutts "shop," like a *mis*alliance.

Thoroughness must always command respect. Thomas Coutts made a religion of his bank, and worked hard and successfully to increase its power and prestige. One respects his spirit, though one may not feel that banking is a good sort of religion. At the same time one admits that while there is a personal element in it banking is one thing, and that when the personal element is lost it is something very different. The human scale is forgotten. Mechanism supplants the mind. The bright eyes of the extravagant duchesses twinkle in vain.

But, murmurs Mr. Jenkinson the Statu-quo-ite, at least nowadays they don't hang a man for stealing a sheep.

P.B.

MEETINGS OF THE SOCIETY

ORDINARY MEETINGS

Wednesday evenings, at 8 o'clock (unless otherwise announced).

JANUARY 8.—SHAW DESMOND, "The Novel—What it is and what it is not." P MORLEY HORDER, F.S.A., will preside.

JANUARY 15.—JOSEPH BURTON, A.R.C.Sc.I., of Pilkington's Tile and Pottery Company, Ltd., "Quality in Pottery." PROFESSOR H. E. ARMSTRONG, Ph.D., LL.D., D.Sc., F.R.S., will preside.

JANUARY 22.—GILBERT STONE, Barrister-at-Law, Legal Consultant to the Advisory Council on Minerals of the Imperial Institute, "Observations on the Mining Laws of the British Empire." SIR RICHARD A. S. REDMAYNE, K.C.B., M.Sc., M.Inst.C.E., will preside.

JANUARY 29.—SIR THOMAS HOLLAND, K.C.S.I., K.C.I.E., D.Sc., F.R.S., Principal and Vice-Chancellor of Edinburgh University, "International Movement of Mineral Products during Peace and War." (Trueman Wood Lecture). THE RIGHT HON. VISCOUNT CHELMSFORD, G.C.S.I., G.C.M.G., G.C.I.E., G.B.E., will preside.

FEBRUARY 5.—SIR WILLIAM CLARE LEES, O.B.E. (British Economic Mission to South America), "Some Aspects of the Question of Trade with South America." SIR EDWARD T. F. CROWE, C.M.G., Comptroller General, Department of Overseas Trade, will preside.

FEBRUARY 12.—HOLBROOK JACKSON, Editorial Director of "The Drapers' Organiser," "Colour Determination in the Fashion Trades." The RIGHT HON. LORD EBURY, D.S.O., M.C., Chairman, Army and Navy Co-operative Society, will preside.

FEBRUARY 19.—"Alfred Stevens, Architect, Sculptor, Painter."

FEBRUARY 26.—PROFESSOR F. A. E. CREW, M.D., D.Sc., Ph.D., Director, Animal Breeding Research Department, University of Edinburgh, "Genetical Methods of Live Stock Improvement."

MARCH 5.—PROFESSOR ARTHUR R. LING, M.Sc., F.I.C., School of Malting and Brewing, University of Birmingham, "Brewing as a Branch of Science." SIR WILLIAM WATERS BUTLER, BT., F.C.S., Past-President of the Institute of Brewing, will preside.

MARCH 12.—PROFESSOR G. ELLIOT SMITH, M.D., F.R.S., "The Human Brain." SIR OLIVER LODGE, LL.D., D.Sc., F.R.S., will preside.

MARCH 19.—MRS. KATHERINE B. ESDAILE, "The Portrait in later Monumental Sculpture."

MARCH 26.—HOWARD ROBERTSON, F.R.I.B.A., Principal of the Architectural Association Schools. "Architecture of To-day and To-morrow."

APRIL 2.—NATHANIEL LLOYD, O.B.E., F.S.A., "Building Craftsmanship."

APRIL 30.—REV. PERCY DEARMER, D.D.

MAY 7.—S. K. RATCLIFFE, "National Parks."

MAY 14.—H. GRANVILLE-BARKER, "A National Theatre."

MAY 28.—"The Bi-centenary of Wedgwood." MAJOR FRANK WEDGWOOD will preside.

INDIAN SECTION.

Friday afternoons at 4.30 o'clock.

JANUARY 10.—SIR BASIL P. BLACKETT, K.C.B., K.C.S.I., "The Economic Progress of India." The Marquess of Reading, G.C.B., G.C.S.I., G.C.I.E., G.C.V.O., will preside.

FEBRUARY 7.—G. H. TIPPER, "Recent Mineral Development in India."

MARCH 7.—

APRIL 4.—LIEUT.-COLONEL SIR WOLSELEY HAIG, K.C.I.E., C.S.I., "The Maratha Nation." (Sir George Birdwood Memorial Lecture).

MAY 9.—DAVID CLOUSTON, C.I.E., M.A., D.Sc., "The Report of the Royal Commission on Indian Agriculture."

DOMINIONS AND COLONIES SECTION.

Tuesday afternoons at 4.30 o'clock.

JANUARY 28.—SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., "Settlers' Problems in Kenya." THE RIGHT HON. W. G. A. ORMSBY-GORE, P.C., M.P., will preside.

FEBRUARY 25.—

MARCH 25.—O. J. R. HOWARTH, O.B.E., M.A., Secretary, British Association for the Advancement of Science, "The Work of the British Association in Relation to the Empire."

APRIL 29.—

CANTOR LECTURES.

Monday evenings at 8 o'clock.

HAROLD WRIGHT (of Messrs. P. & D. Colnaghi & Co.), " Three Master Etchers: Rembrandt, Meryon, Whistler." Three Lectures. January 20 and 27, February 3.

LECTURE I.—THE ETCHINGS OF REMBRANDT VAN RIJN, 1606-1669. Rembrandt's predecessors in etching. His earliest etchings. Etchings of beggars. The illustrations of Biblical subjects. The Landscapes. The portrait etchings. Influence of Rembrandt's work on subsequent etchers. Tributes to Rembrandt's genius as an etcher.

LECTURE II.—THE ETCHINGS OF CHARLES MERYON, 1821-1868. Meryon's parentage. His youthful voyage to the South Seas. Return to Europe. Initiation into painting and etching. Etchings after Zeeman. The Paris etchings. The Bourges and South Seas plates. The Portraits and other commissioned plates. Meryon as a Social Reformer and Poet. His death. Some tributes to his genius.

LECTURE III.—THE ETCHINGS OF JAMES MCNEILL WHISTLER, 1834-1903. His student days. Etchings of Alsace and Paris. He comes to London. The Thames series. The Portraits and Landscapes in drypoint. The Transition Period. The First Venetian series. The second Venetian series. The Cameos. The Etchings of Touraine, Paris, Brussels and the Netherlands. Whistler's influence on the revival of etching. Some tributes to his genius.

ALFRED B. SEARLE, " Recent Improvements in Methods of Brickmaking." Three Lectures. February 17 and 24, March 3.

LECTURE I.—Bricks still the most pleasing of artificial building materials; some reasons for this. Hand-moulded bricks the most beautiful but too costly and too difficult to produce for many modern requirements. Enormous quantities now needed yearly necessitate mechanical methods of production from many kinds of materials.

Modern methods for making bricks of plastic or potentially plastic clays. Plain Bricks. Rustic Bricks.

LECTURE II.—Methods for making bricks of clay, shales, and other slightly plastic materials. The Stiff-plastic Process. The Semi-dry Process. The Tunnel Kiln and its effect on Brickworks Design. Multi-coloured Bricks.

LECTURE III.—Methods of making bricks of non-plastic materials. Sand-lime Bricks. Slag Bricks. Clinker Bricks. Bricks from Colliery Tips. Cement or Concrete Bricks. Silica Firebricks. Magnesite Bricks. Zirconia Bricks. Sillimanite and allied Bricks. Conclusion.

COMMANDER F. G. COOPER, R.D., R.N.R., " Aids to Navigation." Three Lectures. March 24 and 31, April 7.

LECTURE I.—The Mariner's Compass in various forms. The Marine Chronometer. The Pelorus and Bearing Plates. Parallel Rulers and Protractors. The Station Pointer. The Sextant and Quadrant. Dividers. The Range Finder.

LECTURE II.—Sounding Machines and Echo Sounding. W.D. Finder. Submarine Sound Signals. Whistles and Syrens. Barometers and Thermometers. The Baro-Cyclonometer (Algue's). Telescopes and Binoculars.

LECTURE III.—Clear View Screen. Patent Logs. Chernikeeff Log. Navigation in Fog. Leader Cable. Janus System of Signalling. Bell Buoys, etc. Star Charts and Globes. Tide Charts. Nautical Tables and Books. Noctovisor (Professor Baird's).

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

Monday, January 6..Ancient Buildings, Society for the Protection of, at the Royal Society of Arts, Adelphi, W.C. 8 p.m. (1) Mr. Jan den Tex, "Windmills in Holland. (2) Mr. R. Wailes, "The Development of the English Windmill."

Architects, Royal Institute of British, 9 Conduit Street, W. 8 p.m. Dr. Raymond Unwin, "Regional Planning with special reference to Greater London."

Automobile Engineers, Institution of, at the Merchant Venturers' Technical College, Bristol. 7 p.m. Mr. Lewis Morgan, "Organisation of Public-Service Motor Vehicle Repair and Maintenance Systems."

Electrical Engineers, Institution of, at the University, Liverpool. 7 p.m.

Geographical Society, at the Aeolian Hall, New Bond Street, W. 3.30 p.m. Major C. K. Cochran-Patrick, "Places seen from the Air." (Juvenile Lecture.)

Surveyors' Institution, 12 Great George Street, S.W. 8 p.m. Mr. W. Townend, "Town Planning of Built-up Areas."

Victoria Institute, at the Central Hall, Westminster, S.W. 4.30 p.m. The Rev. F. W. Pitt, "Christ and the Scriptures—What may we gather from His Attitude and Instruction?"

Tuesday, January 7..African Society, at the Royal Society of Arts, Adelphi, W.C. 5 p.m. Captain Frederic Shelford, "Africa Its Animals and Peoples."

Automobile Engineers, Institution of, at the Royal Society of Arts, Adelphi, W.C. 7.45 p.m. Mr. T. W. Cooper, "Roller Bearings."

Empire Society, at the Hotel Victoria, Northumberland Avenue, W.C. 8.30 p.m. Sir Hamilton Grant, "Afghanistan and the Pathan Border."

Physical Society and Optical Society, at the Imperial College of Science and Technology, Imperial Institute Road, S.W. 8 p.m. The Right Hon. Lord Rayleigh, "Iridescent Colours in Nature from the Standpoint of Physical Optics."

Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr. S. R. K. Glanville, "How Things were done in Ancient Egypt. Lecture V.—The Workshops."

Television Society, at the Engineers' Club, Coventry Street, W. 8 p.m. Mr. W. S. Newton, "Photographic Problems of Picture Telegraphy."

Wednesday, January 8..Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m.

Fuel, Institute of, at Burlington House, W. 6 p.m. Mr. O. Kubalek, "Fuel Economisers with special reference to their Construction, Materials and Recent Developments."

Geological Society, Burlington House, W. 5.30 p.m.

Heating and Ventilating Engineers, Institution of, at Swedenborg Hall, 20 Hart Street, Bloomsbury, W.C. 7 p.m. Mr. C. A. Masterman, "Observations on Flue Equipment."

Institution of Sanitary Engineers, at Denison House, 296 Vauxhall Bridge Road, S.W.1. 7.30 p.m. Mr. W. L. Jenkins, Presidential Address.

Literature, Royal Society of, 2 Bloomsbury Square, W.C. 5.15 p.m.

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds. Mr. C. S. T. Paul, "Propeller-Type Water-Turbines."

North-East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-on-Tyne. 7.15 p.m. Exhibition of Films provided by Messrs. Alfred Herbert, Ltd.

Physical Society and Optical Society, at the Imperial College of Science and Technology, Imperial Institute Road, S.W. 8 p.m. Mr. S. G. Brown, F.R.S., "Gyro Compasses for Gun-Fire Control."

United Service Institution, Whitehall, S.W. 5 p.m. Colonel P. L. Hanbury, "The Functions of the Territorial Army."

Thursday, January 9..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Mr. R. McKinnon Wood, "New American Wind Tunnels."

Asiatic Society, 74 Grosvenor Street, W. 4.30 p.m. Mr. H. A. R. Gibb, "The Origins of Arabic Poetry."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Messrs. T. W. Ross and H. G. Bell, "Recent Developments in the Protection of Three-Phase Transmission Lines and Feeders."

At University College, Dundee. 7.30 p.m. Mr. G. H. Chalmers, "Lubrication."

Goldsmiths, Worshipful Company of, Goldsmiths' Hall, Foster Lane, E.C. 7 p.m. Mr. Howard Robertson, "Modern Design and Decoration."

Historical Society, 22 Russell Square, W.C. 5 p.m. Mr. B. R. Leftwich, "The Later History and Administration of the Customs Revenue (1671-1812)."

Linnean Society, Burlington House, W. 5 p.m.

Marine Engineers, Institute of (Junior Section), 85-88 The Minories, E.C. 6.30 p.m. Film Display.

Mechanical Engineers, Institution of, at the Royal Technical College, Glasgow. 7.30 p.m. Annual Meeting. Eng. Vice-Admiral R. W. Skelton, "Progress in Marine Engineering." (Thomas Lowe Gray Lecture.)

At the South Wales Institute of Engineers, Cardiff. 6.30 p.m. Annual Meeting. Mr. J. J. McKenzie, "Construction and Operation of Oil-Tankers."

At the Engineers' Club, Manchester. Annual Meeting. Mr. E. O. Jones, "Protective Coatings for Iron and Steel."

At the Engineers' Club, Manchester. 7.15 p.m. Mr. D. R. Carling, "Articulated Locomotives."

Metals, Institute of, at 83 Pall Mall, S.W. 7.30 p.m. Mr. George Mortimer, "The Aluminium Industry."

North-East Coast Institution of Engineers and Shipbuilders, at the Cleveland Institution, Middlesbrough. 7.30 p.m. Mr. J. W. Hobson, "Locomotives for Industrial Purposes and their Maintenance."

Oil and Colour Chemists' Association, at 30 Russell Square, W.C. 7.30 p.m. Paper by Dr. L. A. Jordan.

Physical Society and Optical Society, at the Imperial College of Science and Technology, Imperial Institute Road, S.W. 8 p.m. Sir Ambrose Fleming, "Television, Present and Future."

Refrigeration, British Association of, at the Institution of Mechanical Engineers, Storey's Place, S.W. 5.30 p.m. Mr. B. C. Oldham, "Some Considerations in Design of Modern Refrigerating Plant."

Royal Institution, at the Institution of Electrical Engineers, Savoy Place, W.C. 3 p.m. Mr. S. R. K. Glanville, "How Things were done in Ancient Egypt. Lecture VI.—Hieroglyphs."

Friday, January 10..Astronomical Society, Burlington House, W. 5 p.m.

Chemical Industry, Society of (Chemical Engineering Group), at Burlington House, W. 8 p.m. Mr. J. R. Booer, "Autogenous Welding in Chemical Works."

Electrical Engineers, Institution of, at the Free Trade Hall, Manchester. 7 p.m. Captain P. P. Eckersley, "Broadcasting by Electric Waves." (Faraday Lecture.)

Geographical Society, at the Aeolian Hall, New Bond Street, W. 3.30 p.m. Mr. H. G. Watkins, "By Canoe and Dog Sledge in Labrador." (Juvenile Lecture.)

Geologists' Association, at University College, Gower Street, W.C. 7.30 p.m. Mr. J. Pringle, "The Geology of Ramsey Island (Pem.)."

Malacological Society, at University College, Gower Street, W.C. 6 p.m.

North-East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-on-Tyne. 6 p.m. Mr. L. C. Burrill, "Design and Construction of the Rail-Car-Carrying Steamship 'Seatrain.'"

Oil and Colour Chemists' Association, at Milton Hall, Manchester. 7 p.m. Prof. T. P. Hilditch, "Recent Research on Fats bearing upon the Drying of Oils in Paint and Varnish."

Philological Society, at University College, Gower Street, W.C. 5 p.m. Mr. G. G. Loane, "Notes on N.E.D."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NOTICES

NEXT WEEK

WEDNESDAY, JANUARY 15th, at 8 p.m. (Ordinary Meeting.) JOSEPH BURTON, A.R.C.Sc.I., of Pilkington's Tile and Pottery Company, Ltd., "Quality in Pottery." PROFESSOR H. E. ARMSTRONG, Ph.D., LL.D., D.Sc., F.R.S., will preside.

DR. MANN JUVENILE LECTURES

On December 30th and January 1st, the two Juvenile Lectures, which are given annually at this season under the Dr. Mann Trust, were delivered by CAPTAIN C. W. R. KNIGHT, M.C., F.R.P.S., F.Z.S. In the first lecture, on the Golden Eagle, he described in direct and breezy style his experiences in taking a cinematograph film of an eagle's eyrie in the Highlands of Scotland, and the film record, which was simultaneously shown, of the young eagles on the nest being fed by their parents, the various stages of their growth, and their tentative efforts to fly, was exceedingly entertaining, as were also the slow motion pictures of the movement of the wings of the parent eagles in flight. Not the least interesting part of the lecture was Captain Knight's account of the preparation of an observation shelter, which has to be carried out under considerable difficulties and very slowly, so as to avoid alarming the birds.

Captain Knight's second lecture, entitled, "Wild Life in the Tree Tops," was accompanied by a film showing the nests and young of a number of birds—herons, hawks, owls and woodpeckers. As in the case of the eagle's eyrie, the young audience followed with delighted interest the gradual evolution of the young herons in their lofty nest at the top of a very tall tree, the comings and goings of the parents and the first flights of the young birds. Similar pictures were shown of the home life of the owl, kestrel and sparrow-hawk.

At the end of the second lecture Captain Knight introduced to his audience "Mr. Ramshaw," the golden eagle which he has trained as a falcon, and some photographs were taken of the lecturer with "Mr. Ramshaw" on his arm surrounded by a group of children.

At the conclusion of the proceedings, a vote of thanks to Captain Knight for his very entertaining lectures was proposed by the Chairman of Council, Mr. L. B. ATKINSON, M.I.E.E., and carried unanimously.

NEWS OF THE WEEK

> "We allow vandalism which has no excuse—vandalism which we do no ourselves desire. We cannot claim the excuse of Goths breaking down some civilisation we do not like, but breaking down the one we do like. We have a right to destroy our own country, but it is not being destroyed by us, but by powers more vast than have ever been known and more secret than have ever been tolerated."
>
> *G. K. Chesterton.*

Correspondence in the *Daily Telegraph* on the subject of the disfigurement of England continues to excite general notice, and it looks as if this powerful paper is determined to focus public attention on the subject, although up to date there does not seem to be any definite conclusion as to what is the best policy for a co-ordination of all the forces for preservation. Major Richard Rigg, a Fellow of the Society, makes what seems to be an admirable suggestion, and writes as follows :—

> As a recent, but enthusiastic, Fellow of the Royal Society of Arts, I should like to support Mr. Morley Horder's conclusion that there is no other Society which could focus attention with such authority on this urgent subject.
>
> *The Daily Telegraph* is doing a great service in giving space to the discussion and getting the attention of the business and advertising mind.
>
> May I make a suggestion ? For over a quarter of a century I have been associated closely with the English County Society movement in London—a movement which the Royal Society of Arts has consistently fostered and encouraged.
>
> In London there are thirty English county societies, and of these twenty-four are affiliated to the English County Societies' Conference. These societies have as their prime objective the inculcation of local patriotism and the preservation of the customs, traditions, and rural amenities of their respective counties.
>
> The county societies are doing a splendid work, but, in my judgment, the area of their usefulness could be extended considerably and increased life and activity be given them if they were linked up with the Royal Society of Arts in this truly patriotic work. Their members could hold a watching brief for the Society of Arts, and this, along with the close contact established with the counties, would be an inestimable boon and to the mutual advantage of both movements.

In our issue of December 6th, reporting a paper on rural amenities, the speaker showed a photograph of Newcastle House, Lewes, and also a photograph of the building in course of demolition. These were reproduced in the *Journal.*

Considerable interest was taken in these slides, and a lady in the audience suggested that a telegram should be sent to the Town Clerk of Lewes deploring its destruction. This was done, and duly acknowledged. Sir Reginald Blomfield, the Consulting Architect to the Town Council, has attacked the speaker in Saturday's *Daily Telegraph*, and we propose publishing his letter and the reply in our next issue, as we think it will be interesting to our Fellows.

An interesting development has taken place at Dorking. Fifty or more residents at the top of Box Hill are refusing to pay their rates to the Reigate Rural Council as a protest against encampments of broken-down omnibuses, caravans, ramshackle sheds, and tents which have sprung up in the district in the last three years. May we suggest that other districts should follow their excellent example ?

The attention of the Society has been called to an Elizabethan cottage in respect of which a closing order has been made. This 16th century thatched cottage is at Sedlescombe, East Sussex, and other old cottages in the village have been similarly threatened. The Society would like to appeal for a reconsideration of the Council's decision. They have had recent experience of the very satisfactory result of intelligent restoration of apparently derelict cottages, and are ready to give the Council the benefit of this experience. The materials and construction of such cottages are of a quality that when remodelled they are infinitely better and more habitable than any modern Council cottages could possibly be.

The Society for the Protection of Ancient Buildings has drawn our attention to the proposed widening of Crendon Street, High Wycombe, in order to facilitate traffic on the main London-Oxford Road to Hatfield. Crendon Street has been known to generations of Quakers, who flourished there in the Seventeenth Century, and Ellwood, the Penningtons, and others used to meet there. Among the old dwellings which will be demolished are Lane's Almshouses, dated 1674, and the typical Quakers' Meeting House, supposed to have been founded in 1684. The Town Clerk has been good enough to give the Society all information in regard to this, and a plan of the proposal. It is quite clear that the Town are in a considerable difficulty here. The Society will consider this matter at their next meeting on the 5th February, and make a report thereon.

The Minister of Health, the Rt. Hon. Arthur Greenwood, has expressed his interest in the restoration of the Bibury Cottages, and has written to say that should his engagements permit he will, in the early spring, inspect these and unveil the tablet which the Society has fixed to the buildings to commemorate the work. He proposes at the same time to go to the village of Filkins and inspect some cottages which the Hon. Stafford Cripps is building in the Cotswold manner for the local authorities.

The Society have now possession of the house in the centre of West Wycombe village, and the work of restoration will start at once, so that they will have an official centre here where all information as to the work of the Society can be obtained.

In the *Journal* dated March 15th, 1929, it was stated that an anonymous donor who had previously given £500 to the Fund for the Preservation of Ancient Cottages had offered to contribute 10 per cent. of all additional sums which might be received between January 1st and December 31st, 1929, from those who had subscribed to the Fund from its commencement up to the date of the First Annual Meeting. The total amount of subscriptions received during this period, including donations specially earmarked for West Wycombe, was £4,495 and a cheque for £449 10s., being 10 per cent. of the total, has now been received from the anonymous donor.

PROCEEDINGS OF THE SOCIETY

CANTOR LECTURES

WIND INSTRUMENTS FROM MUSICAL AND SCIENTIFIC ASPECTS.

By E. G. Richardson, B.A., Ph.D., D.Sc.,

Lecturer in Physics, University College, London

Lecture II.—*Delivered November 25th*, 1929.

In this lecture I propose to discuss the scientific principles underlying those modes in which the vibrations of a column of air may be excited and maintained. There is first the whistle method, illustrated by the flute and flue pipes on the organ, then the reed, and finally the lips of the player vibrating across a mouthpiece as in the "brass."

I propose to devote a considerable portion of this lecture in elucidating the function of the blast of air at a mouthpiece of the whistle type, as this is a subject upon which a considerable amount of research has been done in the last twenty years. We no longer speak of the vibrations of an "air reed" in this connection.

In opening this question, I must refer to a little instrument which is not a wind instrument in the generally accepted meaning of the term, namely, one which employs the vibrations of a column or cavity of air, since the sound is given out by vibrating *strings*, and yet in another sense it is the one and only "wind" instrument, for the vibrations of the strings are excited by the natural wind. I refer to the *Æolian harp*. This, too, is of very ancient origin, references to it being found in many old texts, though not under the above name, which is derived from Æolus, god of the winds. References to harps belonging to King David and to St. Dunstan, which produced music without the touch of human hands when hung in the breeze from the open window, or the draught induced by a fire, seem to indicate this type of sound-excitation. Athanasius Kircher in his *Musurgia*

Universalis (1620) gives instructions for making an instrument to be held in front of the fire:—"*In Æoliis pilis aer fervore ignis agitatus insolitum quendam et harmonium strepitum incitat.*" Such harps consisted of a number of equal strings tuned to the same note, and stretched across a sound-box. Afterwards a funnel was added to direct the wind on to the strings, and when it was found that the thickness of a string was a factor involved in the success or failure of the wires to "sing" in a draught of a certain speed, the wires were made of various diameters, in order to increase the probability of one or other of them sounding when blown upon. Such Æolian harps were formerly made and sold as toys, but I have been unable to obtain one in London, although I came across one in a German trade catalogue recently which was intended to be pivoted on the top of a pole out of doors, and to serve the double purpose of music-provider and weather vane! We may, however, produce Æolian tones by simpler means than this. The boy who stretches a piece of elastic across the handlebars of his bicycle in order that it may whirr in the air as he rides, is using the same idea, and the noise from an overhead telegraph in the wind is mainly due to the same cause. It makes no difference whether the wind blows across a stationary wire, or whether the wire is moved at right angles to itself through still air. It is the velocity of the air relative to the wire which matters. I have a simple apparatus of quite ancient invention for investigating this phenomenon. It consists of a small "whirling arm" by means of which a piano wire may be whirled round in a circle. The wire is clamped between the ends of two long arms which spring from a horizontal axle, so that the wire remains parallel to the floor during its sweep. The machine is worked by a belt from an electric motor to a pulley on the end of the axle. Soon after starting the motor we may hear, at a certain slow speed of rotation, the fundamental tone of the wire. If the speed is increased, this dies down until, at about twice the first speed, we hear the octave; this is followed by the twelfth, and so on. In these instances the wire is vibrating in aliquot parts, and at a proportionately higher frequency.

Now experiments have established the fact that the cause of the vibration of the wire lies in the eddies which are periodically shed from behind it. We may examine the formation of these eddies at close hand where a twig dips into a running brook. It will be observed that the eddies leave the twig at regular intervals, but alternately, first from one side of the twig and then from the other, so that an avenue of these little whirlpools in alternate formation stretches out behind the obstacle, the first being on one side of the avenue, the second on the other, etc., like lamp-posts spaced along a suburban street. The formation of these eddies causes a periodic push and pull upon the twig in a direction perpendicular to that of the stream. If the period of this force should coincide with one of the natural periods of vibration of the twig, the latter will be set into oscillation with this period of considerable amplitude, just as a swing may be given a large oscillation, if the periodic forces with which we act upon it are timed to the natural motions of the swing. This is what happens when a string of the Æolian harp is set "singing" by the wind, and explains why the singing occurs only at certain definite values of the wind-speed.

I have digressed at some length in following out the phenomenon of Æolian tones, because these eddies are produced in a very similar form at the embouchure of a flute pipe. The proceedings which take place at such an embouchure may be termed rather aptly Æolian tones turned inside out. Instead of an obstacle in a stream producing the eddies we have a jet of air at high velocity debouching upon moderately still air against which it rubs, tending to curl up into eddies as it does so. In the ordinary way this causes the jet to splash out into general turbulence, i.e., the eddies adopt no regular formation,—compare water falling from a house tap—but if the jet impinges on a sharp wedge, the latter is found to stabilise the system, breaking up the disturbance into definite and alternate eddies, and marshalling these into two ranks which pass down, one on each side of the wedge.

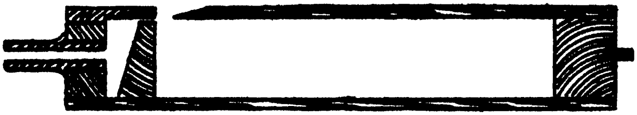

FIG. 9

Fig. 9 shows a section of an organ pipe of the type known as stopped diapason, made of wood Wind under pressure is led into the foot and is deflected by the *languid* out of a slit at the *lower lip* of the pipe, in a broad jet which is directed upon the *upper lip*, formed by bevelling down this side of the pipe. Here then we have at the mouth of the pipe a system which is capable of producing this important avenue of eddies, which originate an " edge tone " (as it is called) at a pitch equal to the number of eddies which strike the edge of the upper lip in one second. The distance between the slit and the edge which faces it plays a conspicuous part in fixing the pitch of the edge tone, and is called the height of the mouth.

Now it is essential to realise not only that this eddy system is responsible for initiating and maintaining the sound of the organ pipe, but that a distinctly audible musical sound may be produced by such a system *without any pipe at all.* To show this I take a box fed with wind from a rotary blower, and provided with a slit about one millimetre wide and several centimetres long, in a brass plate forming one end of the box. Facing this slit is a wedge of brass, having its sharp edge parallel to the slit. The edge is on a slide rest, such as that used on lathes for holding the cutting tool, enabling it to be orientated in a longitudinal and in a transverse direction relative to the slit. The first of these movements corresponds to an alteration of the height of the mouth in the pipe, the second to pushing the upper lip in or out of the jet of air, which is a procedure adopted in " voicing the pipe." In the apparatus I am describing there is nothing to act as pipe or resonator. Two facts may be demonstrated by means of this apparatus.

(1) Keeping the wind pressure and therefore the jet-velocity constant, the pitch of the edge tone heard is inversely proportional to the height of the mouth (distance from slit to edge).

(2) Keeping the edge at constant distance, but increasing the wind pressure, the pitch of the edge tone is directly proportional to the jet velocity. The formula which contains these two facts is :—

$$\text{Pitch of edge tone} = \frac{\frac{1}{2}\ (\text{Velocity of jet})}{\text{Height of the mouth.}}$$

We can explain these facts in terms of the eddies, by noting that in every case an eddy is initiated at the slit just as a preceding one on the same side of the street hits the edge. The ½ in the above formula is due to the fact that the eddies themselves move at only half (approximately) of the velocity of the main jet. This is probably because they are rolled along between two layers of air, the one moving with the velocity of the jet, the other practically stagnant, something like the ball in a ball bearing floating between a moving axle and a fixed hub.

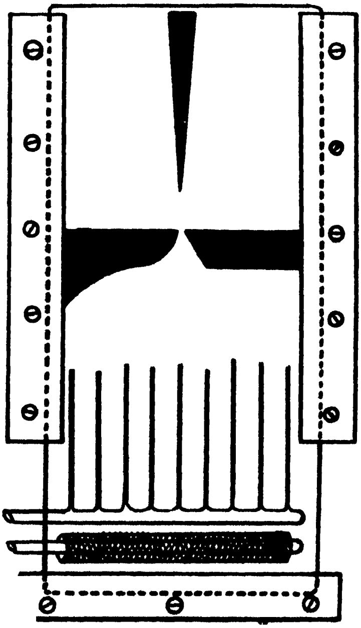

FIG 10

An apparatus (Fig. 10) which demonstrates very beautifully the role of these eddies in the edge tone formation has been made by Dr. R. S. Clay with the co-operation of Mr. V. J. Hinkley, of the Northern Polytechnic Institute, London. The apparatus consists of a large flat channel between two glass plates clamped with a separation of about an eighth of an inch between them. Through this channel water flows from the bottom to the top, coming in through a pipe with holes and a gauze distributor at the bottom of the figure. To mark the lines of flow of the water, ink is let in through a second pipe and a series of narrow glass tubes pointing down stream. Two pieces of ebonite to act as lower lip and languid respectively leave a narrow chink through which the liquid, dragging the coloured filaments with it, is obliged to pass. The jet so formed impinges on the sharply pointed edge of the upper lip represented by the wedge of ebonite seen at the top of the figure. Illuminated from below, the apparatus enables one to watch the evolutions of the slit under the action of the eddies.

Fig. 11 shows a section of a cinematograph film which I made of the motion (the figure is to be read as a continuous film of three successive rows from left to right). Although not so satisfactory as a sight of the film itself, the series of " stills " should enable a reader to visualise what happens in the edge tone phenomenon. The full grown vortices may be observed at the edge, first on one side and then on the other. As they grow and travel down the stream they impress a sinuous motion upon the main jet.

The time is now ripe to consider these edge tones in relation to the rest of the pipe, i.e., to the vibrations of the column of air. The tones which the column of air can give are quite definite. If the pipe is open at both ends, the column can give any or all of the members of the *harmonic series* (*vide* the third lecture), whose frequencies are in the ratio of the numbers 1, 2, 3, 4, 5, etc., whereas a stopped pipe such as that depicted in Fig. 9 produces the odd numbers of this series only. Let us now consider the effect of admitting wind into the pipe at gradually increasing pressure. As we have seen, an edge tone of gradually rising pitch would be produced in the absence of the pipe. But the column of air is trying to impose one or other of its natural frequencies upon the edge tone, and when the latter is near to the fundamental tone of the pipe, the two vibrate in sympathy. The column of air, being the stronger member of the partnership, is able to pull the edge tone out of its proper pitch to a certain extent, but when the edge tone has slightly overpassed the pitch of the pipe the latter will be pulled a little from its natural bent. At a greater extent of mistuning, the system will relapse into silence, to resume at a higher pitch when the edge tone approaches the next higher tone which the pipe can emit (octave for the open pipe, twelfth for the stopped pipe). This is the mechanism of " overblowing " the pipe. Further increase of wind pressure will eventually cause this note to cease, and the next overtone of the pipe to make its appearance.

It is evident then, that, depending on the height of the mouth, there will be a certain blast velocity, and therefore wind pressure, at which the organ pipe will function most efficiently. This will be that velocity at which the edge tone is exactly in tune with the pipe tone. Further, in a complete " stop " of pipes worked off the same pressure and so having nearly equal jet velocities, this theory shows that the height of the mouth should be made inversely as the pitch of the pipe, in accordance with the formula given above. That this is done is evident from an examination of any organ, as the height of the mouth is made a constant ratio to

Fig 11

the effective length of the pipe. In a pipe of this type it is usual to cut nicks in the lower lip and the languid, in order to encourage the production of the eddies so necessary to the correct functioning of the pipe.

On the flute itself the " height of the mouth " is the distance from the slit between the player's lips and the further side of the mouth-hole against which the blast is directed. The flautist can vary both the wind speed and this relevant distance to suit the note determined by his fingering, and by suitably forming the edge tone he can pull the instrument into or out of tune. To this extent the flute is a superior instrument to the organ. It would not be possible from motives of economy or of space to fit keys upon organ pipes in order to vary the pitch of the note obtainable from a single pipe, without some means of altering the wind pressure or the height of the mouth in accordance.

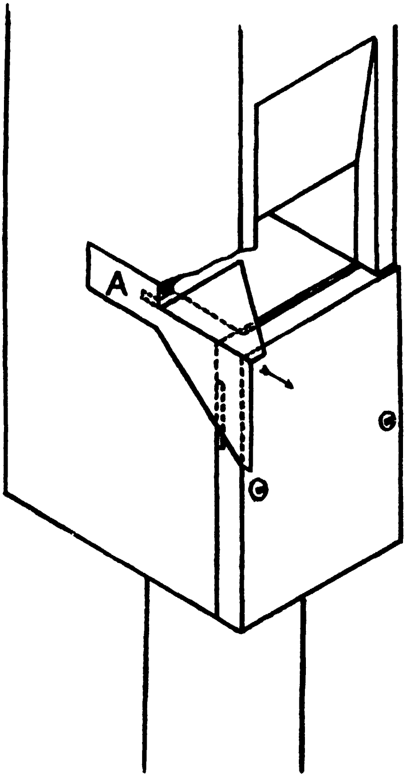

FIG. 12

It will also be apparent that it is not feasible to vary the loudness of the note from a flue organ pipe merely by varying the wind pressure, because this will *ipso facto* change the pitch of the edge tone and so upset the trim of the pipe. What is wanted is a means of reducing the eddying at the mouth which maintains the sound, without altering the frequency with which the eddies strike the upper lip. One way of doing this is to cut off part of the slit through which the air emerges from the foot of the pipe, and so to reduce the width of the jet and reduce the length of the eddy-rollers correspondingly. This is the object of the device patented by Mr. E. Bawtree (Fig. 12). Part of the side of the pipe has been cut away to show the mechanism. Normally the full slit is open and the pipe sounds with maximum loudness. On sliding the piece of brass marked A forward in the direction of the arrow, the slit may be covered up to half of its total width, with a dimunition of intensity and no appreciable change of the pitch of the edge tone. In order to insure that the pressure inside the foot shall not rise owing to the diminished aperture, a vent slit is provided in the side of the foot, which the moveable piece uncovers at the same time that it covers the slit proper, thereby keeping constant the total area through which the wind escapes. It is intended that the invention be applied to a whole stop of pipes, with all the slides on one tracker-bar coupled to a pedal, so that the whole range have their loudness altered together, and the invention is particularly suited to the bass pipes of the pedal organ where the usual swell box would be inapplicable, and where the provision of duplicate stops of differing power entails considerable additional expense owing to the size of these pipes.

The description that I have given earlier in this lecture of the behaviour of edge tones relates to what I call the normal state of these interesting sounds. The phenomenon may, in fact, be a little more complex than this, owing to the incidence of another factor. In the normal state one of these eddies comes to life at the slit just when the preceding one on the same side of the avenue strikes the edge. Now if, on the edge tone apparatus, I increase the height of the mouth beyond a certain limit, the eddies suddenly re-arrange themselves so that there are twice as many between the slit and the edge as before, and in consequence of this double number, twice as many strike the edge per second, and the note is the octave of that which was in being before the jump occurred. On drawing back the wedge still further, another jump, this time to the twelfth of the first tone, can be demonstrated; indeed, up to seven or eight breaks have been observed. They are likely to occur if the edges of the slit are nicked, and if the approach to the slit is abrupt. Another factor which facilitates the transformation is a small jet-velocity, i.e., low wind pressure. It is, in fact, the ratio

$$\frac{\text{Velocity of blast}}{\text{Height of mouth.}}$$

which is relevant; when this ratio is small the normal edge tone system is unstable. One of the easiest ways to show the first break in the double system is to take an ordinary unvoiced pipe and reduce the wind pressure below the stated value. Generally the pipe will cease to speak when the pitch of the edge tone is too far reduced, but at a wind pressure low enough, the jump to the octave of the edge tone will take place, and this will be near enough to the fundamental pipe tone for the latter to be given out again, but much more feebly, owing to the reduced energy in the slow air stream. Besides this " underblown " fundamental, an underblown octave (from an open pipe), may sometimes be heard when a break to a larger number of eddies occurs. It is rather a startling fact, that you can get the octave of an open pipe by underblowing as well as by overblowing it. The striking point about such a demonstration is the cessation of tone as the wind pressure is reduced, and its re-appearance after an interval of silence. I have recommended an unvoiced pipe for this experiment, i.e., one which has not had the jet carefully adjusted to the position of the upper lip, for the voicer endeavours to direct the jet in such a way that when these breaks occur as the wind is admitted to or cut off from the pipe by the depression or release of the appropriate key on the manual, the edge no longer divides the avenue, and so the underblown tone is not produced. I should explain that this reduction in the longitudinal spacing is accompanied by an equal reduction in the lateral spacing, i.e., of the width of the avenue, so that while the edge may be able to divide the wide avenue of the normal eddy system, even if it is a little out of the centre line of the jet, this will not be possible with the narrow avenue unless the edge accurately bisects the jet. By directing the blast a little outside the upper lip the voicer can prevent the occurrence of these underblown tones whenever the pipe is on less than the full wind. When this has not been done the pipe is said to cough or murmur its tone before it gets " on full speech."

If the pipe can be worked off high pressure wind, i.e., if the blast-velocity can be made large, more energy will be available in the edge tone, and if the latter is well tuned to the pipe tone the system will sound efficiently and loudly. As I have explained, the difficulty in regard to using more wind is the tendency of the pipe to overblow to one of the overtones when the wind pressure is increased. If this occurs as the result of one of these breaks, which it is likely to do with a mouth " cut high," we can restore the wider avenue of eddies by suitably directing the jet, and so re-introduce the fundamental of the pipe, and yet keep the larger blast-velocity requisite for greater intensity of tone. This is the principle used in the roller or *bearded pipe*, of which the lower portion is shown in Fig. 13.

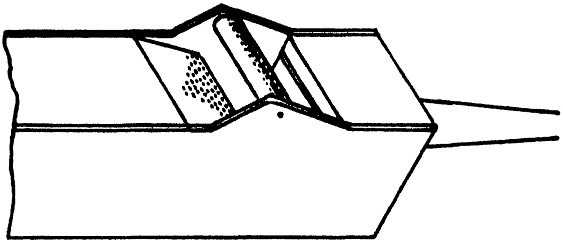

FIG. 13

The roller may be seen in the drawing set parallel to the slit, but standing out a little from the plane of the front wall of the pipe, and about half way between the lips of the pipe. This deflects the blast of air towards the interior of the pipe.

Altogether this blast of air plays a most important part in determining the efficiency and quality of the pipe. There are many factors which may enter into the behaviour of these eddies, only a comparative few of which have yet been investigated. A mastery of the niceties of adjustment of this type of embouchure is the characteristic of the skilful organ-pipe voicer and of the flautist.

The reed as an exciter and maintainer of a column of air is easier to understand than an eddy system. A vibrating strip of metal or cane, clamped at one end, has a fundamental frequency determined by its length, thickness and elasticity. The overtone frequencies are not simple multiples of this fundamental frequency as they are in a column of air, but bear complex ratios to each other. Fortunately when the reed is coupled to a pipe, then its inharmonic overtones are stifled because they are not re-inforced by the pipe. The clarinet family and the organ pipes maintained in this fashion (reed stops) have beating reeds. These are fixed over a beak which leads into the pipe proper in such a manner that once in each vibration they cover the entrance to the pipe, and more or less cut off the supply of air. Cinematograph records of the motion of such a reed show that the reed does not block this entrance completely at any epoch of its motion. It does not literally beat upon the table of its shallot or beak.

The working of the reed when blown is somewhat as follows. As the air rushes through the space between the free end of the reed and the table, it tends to widen the space and thus pushes the end of the reed away from the table, but the reed being elastic when deflected to a certain extent is able to slide back past the rushing air, overshoots its former position of rest, and moves so as to close the gap. It then springs back again, and the widening gap is again assisted by the rush of air. The maximum pressure in the beak is found to occur a little after the widest opening of the gap. When the reed is in tune with the pipe itself, as it should be, the two vibrate in sympathy and each lends energy to the other.

The relations between the note of the reed and that of the pipe are very similar to those between the two corresponding members of the flute system, except that the reed can vibrate only at certain fixed frequencies, whereas the pitch of an edge tone—apart from the breaks—rises continuously with the blowing pressure. If the pipe is in tune with the reed, it is possible to vary the wind pressure over a large range, without fear of the former overblowing. The construction of a typical organ reed pipe is shown in Fig. 14. The wind enters by an orifice on the left into the "boot," which forms a short supply-tube to the pipe. This contains the reed, clamped at its upper end where the reed tube is attached to the roof of the boot. The pipe itself, usually conical in shape, fits tightly over the projecting end of this tube. The reed is tuned by a bent wire which presses the spring against its table

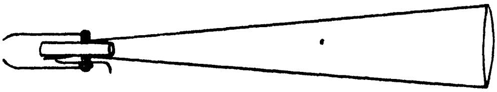

FIG. 14

at any required point, thus shortening the effective length and raising the pitch. This wire can be actuated from outside as it projects through the roof of the boot. Since the supply tube contains a considerable volume it is desirable for the efficient working of the system that it too should be of such a size as to be in tune with the reed and column of air in the pipe, so that all three partners, pipe, reed, and supply tube may co-operate harmoniously.

What was said about the pipe forcing its pitch upon the weaker edge tones applies with equal force to reed pipes, with the proviso that the thicker and stiffer the reed is, the less will it be at the mercy of the pipe. Organ reeds are always made of light and elastic metal ; I can mount the reed boot alone upon the wind-chest, after removing the pipe, and tune it to almost any note I please, and yet be able to make it work the pipe at the pipe's proper pitch, as soon as this is replaced. On the clarinet, especially on its precursor the chalumeau, the reed is so thick that it is more difficult to hold it in bondage to the column of air in the instrument, but the player can adjust the natural frequency of the reed to a certain extent by pressing the fixed end more tightly upon the table with his lower lip for the higher notes. Clarinet reeds differ in another respect from those of organ pipes in that they thicken from the free end to the fixed end where the ligature—a metal band—clips it to the beak. This non-uniformity makes it almost impossible to calculate the frequency of the reed a priori. As the reed is wetted in the mouth of the player it loses its elasticity, being made of cane.

The two reeds of the oboe are of much lighter construction ; the two free ends leave a narrow chink which serves the same purpose as the gap between the beating reed and its table. This narrow chink is alternately opened and closed by the vibrating reeds which move in and out together with a frequency equal to that of the note being produced by the oboe.

It remains to speak of the third type of pipe maintenance, that peculiar to the brass. To a certain extent the scheme is an imitation of the oboe mouthpiece, in that the player's lips do the duty of a double reed. The lips are pressed by the ring-shaped rim of the mouthpiece, and by means of the osculatory muscle the player can alter the tension and vibrating length of these soft reeds. In the mouthpiece provided on the modern horns, that is the end of the story. The mouthpiece tapers gradually into the apex of the horn in a smooth funnel shape. On mouth pieces of the funnel class, however, the " reeds " are assisted by an edge tone system, in that the issuing breath can be directed against a facing a short distance away. The difference between the two mouthpieces is shown in Fig. 15, where the section of a French horn is shown side by side with one from a tuba, drawn to the same scale. The tuba is the largest of this class, the trumpet itself having a smaller mouth of the same shape. The mark of this category is a hemi-spherical cavity or cup, to the back of which the tube itself is quite abruptly inserted, forming a circular edge against which the ring-shaped eddies or vortex rings in the blast can be directed. A brass instrument having this kind of mouthpiece can, in fact, be made to sound if the circular or oval end of a narrow brass tube be placed at the position

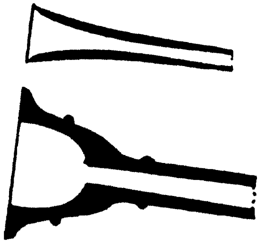

Fig 15

which the opening between the player's lips occupies when applied to the mouthpiece, if a blast of air at suitable pressure is driven through the tube. Such an experiment shows that the vibration of the lip reeds is not essential, though it is true that the sound obtained when the edge tone alone is used as exciting medium is weak.

The vortex rings referred to are similar in shape to those which a smoker can blow from his mouth by tapping the cheeks; they may also be seen emerging from a smoke stack on a still day. In the latter instance, they are not usually produced with regularity. It requires an opposing circular edge to arrange them in order. This principle is used on those little bird-calls or decoys which can be bought in toy shops. The formula relevant to these edge tones is of the same form as that which I have already given for the straight slit and edge.

The fact that the vortex rings are shut in by the cup of the mouthpiece does not prevent the action of the blast, and we can imitate the edge tone in water, using coloured filaments of ink and a chemist's glass thistle-funnel for the cup mouthpiece. The height of the mouth of the brass instruments then becomes the distance from the player's lips to the circular edge at the back of the cup. This, together with the velocity of the issuing breath determines the pitch of the edge tone. In instruments having these cup mouthpieces, then, we have three components which should all vibrate at resonance; the player's lips performing the function of reeds, the edge tone in the mouthpiece, and the column of air in the tube. As testimony to this theory, observation of the relative size of the cup mouthpieces attached to different instruments will show that the depth of the cup is inversely proportional to the lowest note produced from the instrument, just as the height of the mouth of a flue organ pipe is proportioned to the pitch of the pipe. This ensures that all the instruments are blown at approximately the same pressure for their lowest notes. For overblowing, the player compresses his lips, pushes them forward slightly, and blows harder. Reference to the statements above will show that the effect of these manoeuvres is to raise the pitch of the "reeds" and of the edge tone.

The resonant characteristics of the edge tones on instruments supplied with cup mouthpieces are important factors in determining the power and peculiar blare of the notes given out. When a mouthpiece of the conical funnel-shape is supplied, the tone is soft, mellow, and less incisive, for it lacks a true edge tone, whose missing resonance deprives the system of its power. On the other hand, this funnel shape leaves to the player greater facility in modifying the pitch, since he has not to adjust three systems to a pitch which is more or less determined by the instrument. In the larger cupped mouthpieces the edge tone approaches more closely to that on the flute, for the shank of the tube is too wide to permit full use of its circumference. In such large mouthpieces the player directs his breath to one side, using an arc of the circular edge, instead of its full circumference.

The analogy between a brass instrument and the human organ of speech must have struck several of my listeners. In the larynx we have the vocal cords taking the place of the lips on the brass, while the various cavities, mouth, nose, throat, etc., lying above them, determine by the vibration of the air in them the note—particularly the quality of the note—given out by the vocal instrument. I do not propose to speak on the properties of these resonant cavities, as we have an expert on this subject in our chairman, Sir Richard Paget, and I must refer you to a forthcoming book of his for information on this subject. I would, however, like to elaborate a little the analogy between the larynx and a brass mouthpiece. Being struck by the similarity, one naturally looks for something to correspond to an edge. The slit of the vocal cords is set in a direction from front to back of the body. There are several possible edges where the air passage turns the corner into the mouth, but these must be rejected as they lie at right angles to the slit, and also are much further from the vocal cords than the depth of any mouthpiece in use. One next turns to the false vocal cords, the function of which anatomists cannot assign with certainty. These lie in the right direction, but unfortunately are a few millimetres only above the true vocal cords, I had, therefore, rejected the idea that they could act as an edge, and had assigned the human larynx to the category of the conical mouthpieces, i.e., wanting edge tones, but Sir Richard Paget tells me he has seen through the laryngoscope the false vocal cords lifted to quite a distance above the true ones during singing. It would be of interest to have further information from laryngologists on this point, in order that we may assign the voice definitely to the horn or to the trumpet class ; but from the mellow characteristics of the normal voice, I suspect an absence of edge tones. Perhaps we may assign the incisive harshness of the voices of some singers to an abnormally developed " edge " somewhere in the throat.

OBITUARY

Major Percy Alexander MacMahon, R.A., Sc.D., LL.D., F.R.S.—Major Percy A. MacMahon, the distinguished mathematician, died at Bognor Regis on Christmas Day, at the age of 75. He was elected a Fellow of the Society in 1911, and served on the Council as a Vice-President for the years 1923-5. In 1922 he read a paper before the Society on " The Design of Repeating Patterns for Decorative Work," and on various occasions he presided at meetings of the Society and took part in the discussions.

Born in Malta in 1854, he was educated at Cheltenham College and Woolwich, from which he entered the Royal Artillery in 1872. In 1882 he returned to the Royal Military Academy as Instructor in Mathematics, and in 1890 he became Professor of Physics at the Ordnance College. He retired from the Army in 1898, and from 1906-20 he was Deputy Warden of the Standards, Board of Trade.

Major MacMahon's researches were mainly concerned with combinatory analysis, and he contributed numerous papers to the proceedings of learned societies. He was elected F.R.S. in 1890, and in 1894 was President of the London Mathematical Society, which awarded him the De Morgan medal in 1923. He also received from the Royal Society a Royal medal in 1900 and the Sylvester medal in 1919. He was President of the Royal Astronomical Society in 1917, and a member of the Permanent Eclipse Committee. Honorary degrees were conferred on him by the Universities of Cambridge, Dublin, St. Andrews and Aberdeen, and he was a Governor and Fellow of Winchester College. In 1903 he was elected a member of the Athenæum under Rule II.

JOHN C. NICHOLSON, J.P.—Mr. John C. Nicholson, who was elected a Fellow of the Royal Society of Arts in 1913, died on December 14th at his residence on Chelsea Embankment at the age of 69. He was chairman of Messrs. Jenson & Nicholson, Ltd., varnish and enamel manufacturers, who have their principal works at Warton Road, Stratford, and branches in India and various important towns in the Dominions.

Apart from his business interests, Mr. Nicholson was very active in various charitable works. He was chairman of the City of London Maternity Hospital, and was mainly responsible for its rebuilding in 1908. Since 1910 he was trustee of the Finsbury and City of London Savings Bank. He served on the Council of the East India Association, was Treasurer for several years of the "Entente Cordiale," and was J.P. for the County of London and for the borough of West Ham. In 1890 he was Master of the Painter-Stainers' Company. He was deeply interested in freemasonry, having held the office of Deputy Grand Master of Middlesex, and having visited masonic lodges in many parts of the world.

NOTES ON BOOKS

THE UNIVERSE AROUND US. By Sir James Jeans. Cambridge: At the University Press. 12*s*. 6*d*.

This well-printed volume of x + 352 pages contains as an integral part a matured and elaborated version of much—or almost all—of the speculative matter contained in the author's Trueman Wood Lecture, delivered before the Society on March 7th, 1928, and printed in the *Journal* dated April 27th, 1928.

By very fully and aptly clothing this speculative matter with the leading astronomical facts as now accepted, Sir James has given us a volume of unique interest and importance, a volume which will undoubtedly have readers in all parts of the civilised world: moreover a profound study likely to mark an era—or perhaps we should say pause—in that vivid period of experiment with conjecture, which followed Crookes' researches on radiant matter; that is to say, matter actually disintegrating under artificial stress. The first publication by Crookes was a lecture to the British Association in 1879, and a reader wishing to understand fully this early stage with the newer work of Crookes during 23 years (1879 to 1902) should turn to *Nature*, February 20th, 1902, pp. 375-378. On p. 103 Sir James Jeans lists Crookes first in order with Lenard and Sir J. J. Thomson as atom-breakers; then follows a lucid and fittingly concise view of the outcome.

We may presume that at present Sir James' book will not be fully accepted by everyone, but all students know how Francis Bacon emphasises his doctrine that truth emerges more readily from well-ordered studies which contain doubtful speculations than from confusion, and vague or uncertain dictions. In this view Jeans is evidently at one with Bacon, as on p. 8 he tells us that " Science advances rather by providing a succession of approximations to the truth ; each more accurate than the last."

A series of XXIV plates, twenty of nebular or quasi-nebular conditions, provides a basis upon which Jeans builds much of his teaching, and on p. 11 he commences a vivid picture regarding a huge globe of gas contracting into liquid, then plastic; with rocks and mountains " forming a permanent record of the irregularities of its earlier plastic form." Stages of a comparable change set in order on p. 226 are : " Chaos—nebulæ—stars—binary systems—sub-systems."

Under the sub-heading " The Beginnings of the Universe " (p. 323), we are told that " As we go forwards in time, material weight continually changes into radiation." On p. 327 the conclusion is arrived at that " The complete annihilation of all the matter now in the universe would raise the temperature of the earth's surface by the six thousandth part of a degree." The proposition of annihilation as regards matter by a natural or spontaneous disintegration or breakdown is treated of quantitatively, and this from various standpoints. Lower down, on p. 327, under the heading, " The Creation of Matter," we read that " All this makes it clear that the present matter of the universe cannot have existed for ever."

The author's " all this " evidently means his full argument and the work as a whole which must be carefully read to realise his meaning. Our quotations may not seem fully consistent with each other, and with *prima facie* reason unless the book itself is read and studied.

Turning over to p. 328, we find the author's view as to what may be imagined if radiant energy of high availability were " poured into empty space." To shorten it, by using our own words at the risk of making a blunder :—If a universe drifts into energy, this quantum of energy, if having higher availability, may by running down, create a universe similar to that which was annihilated. The " higher availability " is a characteristic of energy having a wave-length very much shorter than that of the most penetrating gamma-rays. To understand this, the whole of Chapter II, " Exploring the Atom," must be read with care, especially pp. 140 to 146.

We return to p. 328, where it is suggested that the short wave-length radiation just mentioned may crystallise into electrons and protons and form atoms. The author then says :—" If we want a concrete picture of such a creation, we may think of the finger of God agitating the ether."

In the next paragraph Sir James touches lightly—and as needs must be—controversially or speculatively on that primary mystery, mere existence. The general reader will remember how Coleridge, when tormented and despairing, exclaims :—" Hast thou ever said to thyself thoughtfully, ' it is ' ? " The author now leads us to regard the universe as " a finite picture whose dimensions are a certain amount of space, and a certain amount of time." Looking backwards in time does not bring us to the creation of the picture, but to its edge, and the reader is led in thought to " those philosophical systems which regard the universe as a thought in the mind of its Creator " (p. 328).

This philosophy of Berkeley is a resting place for many minds, and after making the reference to it the author devotes a few pages to a meditative conclusion; sometimes joy and a glorious future hope, but occasionally with tinges of threnody. In the section, "Life and the Universe," the arguments tend towards regarding the earth as the only seat of life, while the concluding section, "The Earth and its Future Prospects," pp. 336-343, considers a climax.

First we are reminded that the earth which bears on (or near) its face all that we can physically regard as having life, cannot support life for ever, as we "are dependent on the light and heat of the sun, and these will not remain for ever as we now are." Figures, data and thoughtful considerations follow, so when reading p. 340, we are led to think of our oceans as ice and our atmosphere as liquid air. Still, on p. 343, we find a conclusion teaching this doctrine of "hope to the race and responsibility to the individual"; also a hope beyond these.

The author is remarkable for clearness of thought and language, so that this treatise on the highest mysteries of the universe may be studied by schoolboy or professor with similar advantage.

If Sir James had crowded his book with mentions of ancient or intermediate views as to convergent cosmogony, kinetic atomics, space-time, quanta, creation of mass or weight from undulations or polarised units of energy, and creation of mass by radiancy, the work would have lost that notable characteristic which gives it such special value at the present crisis in physical and metaphysical thought: the natural, easy, and comfortable sequence in reading would have been lost. By commencing his kinetic atomics with Rutherford and his atom-breaking with Crookes, the author avoids over-burdening his readers and obscuring the main issues. He may, however, when preparing a second edition, set out in an appendix some clues to a study of the history of atomism and kindred studies. In this aspect we may mention the 364 page quarto of Louis Dutens on "*Origine des Decouvertes Attribuées aux Modernes*," this being the third edition, dated 1796, and printed in London by W. and C. Spilsbury, Snow Hill. On p. 29, in the foot-note, Dutens credits Moschus the Phœnician (who lived before the Siege of Troy) with having published the first germ of the atomic and molecular views subsequently elaborated by Democritus, Epicurus and others. On subsequent pages up to p. 40, Dutens gives long quotations from Aristotle and other classic writers, so as to guide the student to a clear idea of ancient views on atoms and molecules. Plato's study of the views of Protagaras almost touches on the psychical qualities with which Leibnitz endowed the centres of force or kinetic monads, which by dialectics he transforms into the protyl of the universe. Boscovich, in his study of the Leibnitz doctrine, applies the methods of Newton; the result being the earliest work giving a consistent theory of the creation of matter from energy (see Boscovich's "*Philosophiæ Naturalis Theoria*," *Venetiæ*, 1759). Mossotti, who was Professor of Physics at the University of the Ionian Islands during the short period when this territory was under British protection, read a paper on molecular action, in which the views of Boscovich were extended, and a germ of the idea of kinetic radiancy is embodied. A translation into English is to be found in Vol. I of Taylor's *Scientific Memoirs*, and an advance on Mossotti's views was made by Babbage. Dutens, on p. 45 of the above-mentioned third edition, touches on many ancient views as to quanta as factors in atomism, and in a foot-note he quotes from the *Eclogæ Physicæ* of Stobæus, but before forming any opinion on the matter involved, the reader should refer to p. 453 of Daubeny's "Introduction to the Atomic Theory," 2nd ed., Oxford University Press, 1850, where Dr. Daubeny quotes a passage of the Byzantine Greek of Stobæus and gives a translation which shows far-seeing scholarship; moreover, he devotes the two following pages to outcomes and parallels. As regards space and space-time questions, Kant and his followers stand pre-eminent; but one having a set of the Philosophical Transactions at hand may turn to a paper by Brodie, in which a chemical operation is studied in the aspects of quanta and space-time; this paper was published some little time after Brodie took his Chair in Chemistry at Oxford (1866).

Alternatively to a short appendix on general and historical atomics, in a future edition of the work before us, Sir James may possibly give us a companion volume on these subjects.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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Monday, January 13..Automobile Engineers, Institution of, at the Queen's Hotel, Birmingham. 7 p.m. Mr. H K. Whitehorn, "Petrol-Electric Vehicle Characteristics."

Brewing, Institute of, at Charing Cross Station Hotel, Strand, W.C. 7.30 p.m. Annual General Meeting. Mr. James Stewart, "Malting Barleys of 1929."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Discussion on "Efficiency"—opened by Mr. A. Morgan

At Armstrong College, Newcastle-on-Tyne 7 p.m Mr. H. W Taylor, "Voltage Control of Large Alternators."

Geographical Society, at the Æolian Hall, New Bond Street, W. 8.30 p.m. Dr. T. F. Chipp, "Forests and Plants of the Anglo-Egyptian Sudan."

Heating and Ventilating Engineers, Institution of, at the Borough Polytechnic, Southwark, S.E. 7 p.m. Mr. H. A. Leadbeter, "Oil versus Solid Fuels."

Metals, Institute of, at 39 Elmbank Crescent, Glasgow. 7.30 p.m. Mr. A. Wragg, "Extrusion and a Consideration of some of the Physical Properties affecting the Production of Rods, Tubes and Sections by this Process."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5 30 p.m. Mr. Ashton Davies, "Air Transport in Relation to Railways"

Tuesday, January 14 .Automobile Engineers, Institution of, at the King's Head Hotel, Coventry. 7.30 p.m. Mr. J. B. Hoblyn, "Aluminium Alloys from the Users' Point of View."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Mr. Alan E. L. Chorlton, "Railway Traction by Oil Engines."

Electrical Engineers, Institution of, at the Hotel Metropole, Leeds. 7 p.m Informal Discussion on "Colliery Electrification" -to be opened by Mr. I Scott Mackenzie.

At the North British Station Hotel, Edinburgh. 7 p.m. Lt.-Col. S. E. Monkhouse and Mr. L. C. Grant, "The Heating of Buildings Electrically by means of Thermal Storage."

Marine Engineers, Institute of, 85/88 The Minories, E.C. 6.30 p.m. Engineer Rear-Admiral W. M. Whayman, "Water Tube Boilers for Merchant Ships."

Metals, Institute of, at Armstrong College, Newcastle-on-Tyne. 7.30 p.m. Mr. L. Wright, "Chromium Plating."

Petroleum Technologists, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Mr. A. A. Ashworth, "Efficiency in the Distillation of Light Oils from Crude Oil."

Philosophical Studies, British Institute of, at the Royal Society of Arts, Adelphi, W.C. 8.15 p.m. Principal Dr. L. P. Jacks, "The Philosophy of Adult Education."

Wednesday, January 15..Anthropological Institute, at the Portland Hall, Great Portland Street, W. 5.30 p.m. Mr. M. C. Burkitt, "Most Primitive Art."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Prof. Stephen M. Dixon, "Developments in Transportation by Cableways."

Electrical Engineers, Institution of, Savoy Place, W.C 6 p.m. Mr. H. A. Thomas, "A Method of Measuring the Overall Performance of Radio Receivers."

At the Royal Victoria Hotel, Sheffield. 7.30 p.m

Mechanical Engineers, Institution of, at the Grand Hotel, Sheffield. 7.30 p.m. Annual Meeting. Prof. Dr. F. C. Lea, Chairman's Address.

Meteorological Society, 49 Cromwell Road, S.W. 7.30 p.m. Annual General Meeting. Sir Richard Gregory "Weather Cycles and Weather Recurrences"

Microscopical Society, 20 Hanover Square, W. 7.30 p.m. Annual General Meeting. Mr. Joseph E. Barnard, "Resolution and Visibility in Medical Microscopy" Presidential Address.

University of London, at King's College, Strand, W.C. 5.15 p.m. Prof. J. H. Rose, "The Social and Political Ideas of some Representative Thinkers of the Revolutionary Era—Lecture I—Introductory: The Revolutionary Era."

Thursday, January 6..Chemical Society, Burlington House, W. 8 p.m. Messrs. E. E. Coulthard, J. Marshall and F. L. Pyman, "The Variation of Phenol Coefficients in Homologous Series of Phenols."

Electrical Engineers, Institution of, Savoy Place, W.C. At University College, Southampton. 7.30 p.m. (1) Lt.-Col. S. E. Monkhouse and Mr. L. C. Grant, "The Heating of Buildings Electrically by means of Thermal Storage." (2) Mr. T. G. N. Haldane, "The Heat Pump—an Economical Method of Producing Low-Grade Heat from Electricity."

Mechanical Engineers, Institution of, at The Temple, Dale Street, Liverpool. 6.30 p.m. Engineer Vice-Admiral R. W. Skelton, "Progress in Marine Engineering." (Thomas Lowe Gray Lecture.)

At the Queen's Hotel, Birmingham. 6 30 p.m Annual Meeting.

At the Hotel Metropole, Leeds. 7 30 p.m. Prof. Dr. F. C. Lea, Chairman's Address.

Metals, Institute of, at the Chamber of Commerce, Birmingham. 7 p.m. Mr. J. Fallon, "Modern Annealing Furnaces."

Mining and Metallurgy, Institution of, at Burlington House, W. 5.30 p.m.

Patentees, Institute of, at Caxton Hall, Westminster, S.W. 8 p.m. Major the Hon. H. F. Moulton, "Some Desirable Changes in Patent Law."

University of London, at King's College, Strand, W.C. 5.30 p.m. Lieut.-General H. B. Fawcus, "The Royal Army Medical Corps."

Friday, January 17 .Electrical Development Association, British, at the Royal Society of Arts, Adelphi, W.C. 7.30 p.m. Mr. C. H. Smith, "Domestic Hot Water."

London Society, at the Royal Society of Arts, Adelphi, W.C. 5 p.m. Mr. F. W. Parker, "London's Parks and Open Spaces."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 7 p.m. Discussion on "The Pooling of Experience—A Function of the Institution?" introduced by Mr. Thomas Walley.

University of London, at King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "Russian Literary Criticism—Lecture I—The Beginnings: Poets as Critics (1750-1830)."

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A.R.I.

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2

NOTICES

NEXT WEEK

MONDAY, JANUARY 20th, at 8 p.m. (Cantor Lecture). HAROLD WRIGHT (of Messrs. P. and D. Colnaghi and Co.), "Three Master Etchers: Rembrandt, Meryon, Whistler." (Lecture I).

The Lecture will be illustrated by lantern slides.

WEDNESDAY, JANUARY 22nd, at 8 p.m. (Ordinary Meeting). GILBERT STONE, Barrister-at-Law, Legal Consultant to the Advisory Council on Minerals of the Imperial Institute, "Observations on the Mining Laws of the British Empire." SIR RICHARD A. S. REDMAYNE, K.C.B., M.Sc., M.Inst.C.E., will preside.

INDIAN SECTION

FRIDAY, JANUARY 10th, 1930. THE MARQUESS OF READING, P.C., G.C.B., G.C.S.I., G.C.I.E., G.C.V.O., in the Chair. A paper on "The Economic Progress of India," was read by SIR BASIL P. BLACKETT, K.C.B., K.C.S.I. The paper and discussion will be published in the *Journal* on January 24th.

NEWS OF THE WEEK

"We were given our eyes to see things, not to look at them."—Roger Fry.

"The more we know of the past the more we realise how much is to be learnt from it, and how little we have, after all, changed, save in fashions and labels; the smart new cliché of the moment usually masks something that was discussed threadbare in the streets of Ur."—Marjorie Bowen.

Mr. Shaw Desmond's eloquent exposition of his views on the English novel, which are fully reported in our pages this week, excited a very interesting debate. Literature has not recently been the subject of discussion in the rooms of the Society, and it is hoped that next Session another evening may be devoted to this or other kindred subjects. Very authoritative books have been published in the last few years, notably *The Craft of Fiction*, by Percy Lubbock, *Aspects* *of the Novel*, by E. M. Forster, and, quite recently, from the Oxford University Press, *Tradition and Experiment in Present-day Literature*. There is an admirable résumé of the *Story of the English Novel* in Benn's Sixpenny Library, by Mr. J. B. Priestly :—" Prose fiction is a larger mirror of life, and has a greater range than any other form of literature. . . ." Of the latest fiction he says :—" It chiefly expresses the prevailing mood of disillusion and exasperation. . . ." " These young writers are still too busy explaining themselves and giving life a piece of their minds, to explain *other* people and give their minds a piece of life. . It is the day of clever little novels, the cocktails and sandwiches of fiction."

IPSWICH.—Local Fellows of the Society in Suffolk appealed to the Society to send a representative to speak at a meeting organised by the Mayor of Ipswich to form a local society for the protection of its ancient buildings and the beauty of its countryside. The Chairman of the Royal Society of Arts Committee for the Preservation of Ancient Cottages attended and addressed the meeting, and Mr. A. R. Powys attended on behalf of the Society for the Protection of Ancient Buildings. They both sounded the same note, and urged the Society not to confine its attentions to the past, but look also to the present and future. To preserve what was beautiful was not enough ; we must see to it that all we did, if not beautiful, at least was not ugly. It was no good getting excited about the loss of old buildings if we tolerated unpleasant modern buildings and unpleasant advertisements.

RUISLIP. Considerable correspondence has taken place in connection with the visit here of a representative of the Society, and it is expected that, after the next meeting of the Committee, some definite assurance will be forthcoming from the owners that their buildings will be preserved.

ORPINGTON.—The Society's representative visited this once beautiful Kentish village on Saturday last, where he met a Fellow of the Society, and made notes for a report on all the various reconstructions proceeding here. It is a very sad example of the impossibility of adapting an old street to modern conditions. But it is not too late to save some of its charm.

WINDMILLS.—The Society for the Protection of Ancient Buildings is, we gather, making a complete record of all the remaining windmills and their condition. They are so typical a feature of the English landscape, especially in East Anglia, that this ought to be a very useful record. Mr. Jan den Tex, who gave a very interesting lecture on the subject on January 6th, pointed out what should be generally known, that these once essential adjuncts of the English farm still have their economic uses, and there is no argument for their destruction.

NEWCASTLE HOUSE, LEWES.—As it was stated in the last number of the *Journal*, that the correspondence in the *Daily Telegraph* on this subject should be reported this week, we feel bound to refer to the matter, but it is too lengthy for these pages, and enough has probably been said. The Society is glad to feel that the mistake of destroying Newcastle House will not be repeated in other towns.

Abbey Sacristy.—As far back as October 22nd the Dean reported the composition of the small committee to consider the best way to provide his essential accommodation for the services of the Abbey. It is some weeks since the *Times* announced that the Committee had made their report. There is a considerable public that is waiting with some anxiety to read this. Why should there be further delay ?

PROCEEDINGS OF THE SOCIETY

SEVENTH ORDINARY MEETING

Wednesday, January 8th, 1930

Mr. P. Morley Horder, F.S.A., a Vice-President of the Society, in the Chair

The Chairman, in introducing Mr. Shaw Desmond, said that he had rather hoped that Mr. Desmond would have selected a subject about which he (the Chairman) knew something. But what did he know about the English novel ? He felt himself to be in a worse case than Dr. Johnson, who was a Member of the Society in its early years, and who told Boswell that he had several times essayed to speak at its meetings, but that when he did so " all his flowers of oratory left him." If this great Englishman was at such a loss, what must be his position on taking the Chair when a subject like the Novel was to be discussed ? The Society should have secured as its Chairman Mr. Arnold Bennett, Mr. H. G. Wells, or Mr. D. H. Lawrence. But it was worth while recalling that the Society had numbered amongst its members in the past distinguished novelists like Richardson, Sterne, Smollett, and Goldsmith, as well as other famous people like David Garrick and Gibbon. The books written by Mr. Shaw Desmond, which he had read, in particular *The Little Sisters of St. Francis*, were informed by a fine philosophy of life and written with a most delightful humour.

The following lecture was then delivered extempore : –

THE NOVEL—WHAT IT IS, AND WHAT IT IS NOT

By Shaw Desmond

I am sorry that the Chairman has had to apologise for being my Chairman to-night, but I could give him very good reasons why I did not wish Mr. Arnold Bennet, or Mr. Wells, or Mr. Lawrence to be in the Chair. I much prefer to have at my back someone who says that he knows nothing at all about my subject.

There is one peculiar thing about this lecture, which I have given in different parts of the world, but never twice in the same way. It is that I never know quite what I am going to do with my audience or what my audience is going to do with me, and although I believe that the writing of novels is the most important work in the world to-day, I am also assured that I know as little about the novel, even though my profession is that of novelist, as I know about Mr. Morley Horder's profession, which is that of architecture.

It will be easier to begin by telling you what the novel is *not*. I discovered some years ago to my astonishment that my views in this respect were so heterodox that apparently they differed from those of all other novelists. The things which were to me ordinary seemed to some of my friends not only extraordinary, but even heretical. I am still puzzled at the curious difference of view presented by my friends, and sometimes by my enemies—so often my friends—in regard to what the novel is, and what its functions may be.

I am going to give the original explanation of the novel as written in an old Encyclopaedic Dictionary. Of course you are all aware that the word " novel " comes from the old French *novel*, or " new," which, in its turn derives from the Latin *novellus*, a diminutive of *novus*, new. The work I have just quoted defines the novel as follows :--" A work of fiction in prose based on a plot of greater or less intricacy, and exhibiting more or less perfectly pictures of real life, representing the passions, and especially that of love, in a state of great activity. A novel differs from a romance "—I want you to follow this closely—" in that it professes to represent only events of real life, while the romance deals with the supernatural, mysterious, and heroic."

I am going to say at once that the mere fact of our gathering here to-night to consider it is an organised indication of our ignorance. I believe that all institutions are simply masks for ignorance. The moment that human beings realise that they know nothing about a subject, they all, in sheer self-defence, band themselves together into a society in order to tell the world they know everything about it, when they know nothing ! That holds true of every human institution to-day.

I do not know exactly how you feel about the word " novel." It is a stupid and superficial word, an insufficient frothy word for the deepest of all human works. I have tried to get a substitute. I have thought of a " a philosophical story," of " philosophy informed by the artist " ; I have thought of a hundred things, but they are all clumsy substitutes for a word which in itself is a detestable misnomer. The novel is not only *the most important work in the world*, but is really the one work that mankind cannot do without. Even with Mr. Morley Horder in the chair, I will venture to say that we can do without architects, we can certainly do without the town-planners, we can do without some of the advertisers of our day, but not without the novelists, because the novelists are really the media between mankind as a whole, and the Power that lies behind life, and this, to such a degree as neither the painter, the sculptor, nor any other artist, can claim. That is a perfect representation without exaggeration, and I believe you will be more or less in agreement with me before I have finished—though I hope you won't.

Now to consider the novel as it is *not*.

First of all, its function is not to amuse, or, rather, the very last function of the novel is to amuse. It may have many functions, but its supreme function, the function which distinguishes the writer of novels from the artist of every other type, whether the interpretative musician or the creative composer, whether the architect, or painter or the member of any other profession you like to imagine, is to gain *realisation* And that to a degree and upon a scale impossible to any other art.

In the whole of this country of forty-eight million people there may be—it is doubtful— ten novelists of the first class. There are hundreds of novelists of the second class, and tens of thousands of novelists, who are really not novelists at all, of the third class. But the novelist proper—even when he is sometimes improper, as, for example, D. H. Lawrence—is rare. It is the same with fiddlers; there is one Kreisler in the world, two or three men who may be placed near his side, and thousands in the classes below.

The function of the novel is not to *amuse*.

I believe that the country in which I am speaking has one of the worst educated publics in Europe. I say that without any qualification. I wonder if any member of this audience would like to deny it. I only know one public worse educated than the English, and that is my own public—the Irish. The Englishman will occasionally be driven, willy-nilly to read something. The things he usually reads are the lighter side of the newspaper, crime-novelettes, a little about this and a little about that. He has a " smattery " mind. But the trouble about my countrymen, the Irish, is that with all their spirit-uprising, their brilliance, their imagination, their hard calculation--for they are the least sentimental of Europeans except the French (if you can so call a people who are as much oriental as occidental), it would be easier to get a rich fat man through the eye of a needle, than to drive an Irishman to read a book. We Irish live on the froth of politics. Originally it was not our fault; it was forced upon us. We have wasted our lives in reading newspapers and in refusing, gloriously, to learn from other nations. The emotional, not sentimental Irishman is violently, ironically anarchist. (The difference between " emotion " and "sentiment " is the difference between diamond and glass.)

The Englishman, as I have said, can be induced sometimes to read. It is a difficult job, and those like myself, who are members of the National Book Council, know what we are up against. But I do know that if we do not get English people to read novels of the first-class in the way the Germans are reading, in the way even the Russians are reading, in the way the Scandinavians are reading, as part of their daily food, their mental pabulum, we shall never be able to get this country to a point at which we can expect it to hold its own in any field, for good literature trenches on all fields from economics to war. My English friends, with the great soft English heart sentimentally palpitating, sometimes say to me, when I speak to them of their intellectual hiatuses : " But you know, we won the war." Did you?

General Pershing has recently pointed out that every German who was killed accounted for three men killed on the other side. I am not a pro-German, nor a pro-Englishman, nor pro-Irishman for the matter of that, I am here merely as a pro-artist, but I do say that a country which gives a third of its attention and more than half of its income to man-killing in the shape of the finest navy in the world, the one thing in which this nation of amateurs becomes professional, and spends four hundred million pounds a year to keep one-and-a-half million people idle--because that is what the dole and other forms of national insanity are costing to-day—that country is doomed, sooner or later. To save itself, it seems to me it must first of all read the novel, because the novel links it with living people, with reality, the very last thing that the politician, concerned as he is only with vote-catching, troubles about.

Let me just take another thing that the novel is not. Its function is not to *preach*. The moment that the artist propagands, that moment he ceases to be an artist. Take a man like Wells, a novelist of the first class. Wells had the greatest social vision of any European born during the last sixty or seventy years, one which at times, despite his damned utilitarianism, became cosmic. But Wells begins to propagand, and instantly he becomes, not even a novelist of the third class, but a novelist of no class whatever. (By the way, for his last book " William Clissold," I paid 7s. 6d. for each of the three volumes, and now I want my money back. It was so bad that I thought I was reading a Fabian Society's super-tract of the early nineteen hundreds.)

He was a great man, was Wells, a tremendous man, rarely understood by his readers, but the moment he began to propagand he was finished. Very well, the function of the novel is not to preach.

Then what else is it that the novel is not out to do ? It is certainly not to sell. The novelist who sets out to write books only in order to sell them will never sell his books, or, if he does sell them—to put it in an Irish way—he will cease to be a novelist. I do not say that you cannot have best sellers that will not be good novels, but these are so rare that they can almost be counted on the fingers.

Take, for example, Margaret Kennedy's *Constant Nymph*—a fine book, not a great book. (In passing, may I say that the English people (I am not speaking of the Irish or the Scots) have the habit of using " exaggerative " adjectives such as " awfully nice " ; " very wonderful " ; " lovely " and so on. When I saw Carnera fight the other day, the coolest people in the place were the Latins ; the most excitable people were the English, and when little Yehudi Menuhin the violinist, was mobbed the other day in the same building, he spoke in amused surprise at " the excitable English.") But the point is this, the novel that sells *may* be a fine it very seldom is. *The Constant Nymph* was an exception. Remember that novel – Conrad wrote for twenty-odd years before he could earn enough to put really decent clothes on his back and decent food into his stomach. After a time the books of which he had with difficulty once sold a few hundreds were bought to the number of forty or fifty or a hundred thousand. I will go further than that, and will say that as regards the art of writing best sellers—again to use an Irishism—there is no such art. Hutchinson wrote a quite passable best seller *If Winter Comes*, but he himself said quite rightly, that if one tried to write a best seller one would never do it in this life. If one does not try to write a best seller, perhaps one may write a book which will sell. Better, however, a book which sets fifty, or even one, thinking, than a book written for that Mass Unintelligence to which we bow down in our day.

I want now to say something about some of those curious misconceptions concerning the novelist, and also, for it is involved, about his utilitarian importance to society, that is, the necessity of the novel to each woman and man sitting before me as to myself, if we are to know anything of the world.

An example of misconception came home to me on the twenty-second of December last in Glasgow, when a certain famous K.C. was my Chairman.

This gentleman is one of the most intelligent men I know. He it was who made the finest speech of recent years in the House of Commons—which perhaps is not saying too much. But it was this gentleman who said to me afterwards : " You said something on the platform I never heard anyone say before. You boasted about being a novelist. I never heard a man boast about writing a novel—about writing ' books,' yes, but ' novels,' never ! " Then I said, " What about Tolstoy's *Resurrection* ? What about Wells's *Food of the Gods* ? " He replied, " I never thought of those as ' novels '." There you have one kind of misconception. Now for another.

Last week my native town in the South of Ireland discovered me. They found that, to their disgustful surprise— the Irishman is a drunken god who hates to share his throne with any other deity—I was writing novels which had been translated into all sorts of languages other than Gaelic ! There appeared an article in a Waterford paper on the subject. A eulogistic article, you ask ? Not by any means. You don't know the Irish ! No, the editor wrote that here was a man who had just written a novel called " Echo," in which he professed to remember himself as a gladiator under Nero two thousand years ago, a man who was a believer in re-incarnation. He continued : " The gladiator of two thousand years ago talked about blood, lived on blood, never knew whether he would ever get another meal or have a stomach into which to put it if he got it, just the same as the modern novelist ! But what is the good of re-incarnation if it takes two thousand years to develop a man from a gladiator into almost the same thing—a novelist ? Where's the progress ! "

It is said that novels are things that people read in order to amuse themselves. Unfortunately, that is exactly what they do. Yet I am going to say this, that of the thousands of novels—about eight to ten thousand are, I believe, published every year in this country alone—probably not more than thirty produced annually are worthy of living, and very few of those thirty will live, although there will be many others which will live for a little day and will not deserve to do so.

I want here to consider the novel as a mirror held up to life and in its utilitarian aspect at which I have hinted.

The novelist, I have said, is doing the most important work in the world to-day. Can you tell me any other way in which a woman or a man can learn so readily about life as through the modern novel, when it is a novel worthy of the name ? Of such there, with luck, may be written perhaps fifty in the course of the year.

What is a novelist ? *He is a medium.* If he is a great novelist, he is only that in right of the fact that he is abnormally sensitive, that the things which leave unflinched the great sanely healthy crowd, will tear at his heart-strings, to use an excessive phrase. It is because he is sensitive to impressions, because all those vibrations touch him that do not touch the average man or woman, that he is a great novelist. The average man or woman is touched by very few—after forty by an almost irreducible minimum, for most men and women at forty are already comatose. There are any number of dead men and women at fifty years of age walking about and not knowing that they are dead. But the novelist is sensitive to the last heart-beat of his life, and, as I think, beyond. When he loses his sensitiveness, in that moment he ceases to be a great artist, he ceases to be an interpreter either of life or death—the latter being the more urgent of interpretation.

I am going to take a not too great a novel to prove my point. Arnold Bennett is a great artist, he has turned out some of the best work produced in our day. In his *Five Towns* novels we have some of the most neutrally pungent literature in the English language. But there are one or two books of his which—I think he would agree—are beneath publication. I will give you an example of one of the less fine books of Bennett, who if he had only written "Riceyman's Steps" would have been able to look his God in the face.

Bennett is one of the best judges of literature in the world. I nearly always find myself in agreement with him when I had hoped to find myself in disagreement. He is a "decent" man; I never knew a man who had so little rancour or ugliness in him, and we artists, you know, are ordinarily "packed to our kneecaps" with all sorts of venom towards the other fellow. We are enormously susceptible to the weaknesses of humanity—one reason why we are artists. The book of Arnold Bennett's that I want to take is *Lord Raingo*. This is, in a sense, rather a doubtful example of art, and yet it *is* art. In novel writing there is a sort of No Man's Land that separates really fine work from the work of the man who is not a novelist but a tradesman, in which you place the novels that are not quite literature, just as as there is a certain type of journalism which you cannot exactly call "literature" but which you as certainly cannot call "journalism." I will, despite the undeniably great artistry of its author, place *Lord Raingo* in that land; but I will say this about *Lord Raingo*, written as it was, I believe, as a serial—an inferior form of writing—that even in that form this master-analyst of English mediocrity has managed to write a book which is a perfectly clear mirror held up to English politics. If you women and men will trouble to read *Lord Raingo*, you will learn something of what English politics really are behind the scenes, as apart from what you think they are according to your newspapers, or like to think they are according to your proclivities, and you will be saved a great amount of fuzzy-wuzzy thinking and wasted time. In that book Bennett shows the tortuousness of English politics, the craftiness of party leaders. Ladies and gentlemen, you will learn more from that book than you could learn in thirty years about politics or, even from *living* theme. Life is too fragmentary for us to grasp it. Only through the novel can you see life as a whole.

I speak as one who has been to some extent behind the scenes in politics. I have studied politics in every country in Europe. I have—I regret to confess—run for

Parliament, and I say to you that party politics is the dirtiest game played on this planet. Not only is it a shallow game, but a dangerous game for the country where it is played. If you read *Lord Raingo* you will be saved a great deal of heartburn and disillusionment. That is one example where the novel is of vital import to every woman and man in this country who wishes to know the mainsprings of that country.

Coming now to the novelists themselves.

I want now to take certain types of novelists. I divide novelists into two classes. In the first class there may be half a score in this country ; in the other class there are many hundreds. The one class I call *conscious* artists, the other I call the *unconscious*. Of course I speak of novelists who have "the right to write."

Consciousness to any real degree—even terrestrial consciousness—is the rarest of all qualities in the human being, because the whole object of this complicated system of the earth on which we are turning at this moment, of the milky-way, as of the cosmos itself—the only one object in all this, it seems to me, is *the production of consciousness*. By "consciousness" I mean "awareness"—realisation of method and goal. Some men have this quality in a marked degree, although not only do the mass of human beings live and die unconscious, but consciousness itself can be painfully limited.

When I was speaking some time ago to Mussolini in Rome it came home again and again to me that this man, who has so many sides, who is so curiously wrong-headed, I think, in certain respects, owed his power to a desperate sort of consciousness, to the fact that he knows exactly what he is doing, and is going to do it, even though he turns the whole earth back in the process. He is a desperately sincere man, rather a terrible man, but it is because he, inside his limitations, is so conscious that he is such a leader of men. Why is it that in quite another sphere Wells has done such great work, often greater even than that of some of the Russian geniuses, who so often worked in that twilight of the gods which we call the intuitive or unconscious. There is hardly a woman or man in this building whose life has not been slightly deviated—if I may use the word—by H. G. Wells. It does not matter if they have not read his works, they have come under his influence, and it is all because Wells was from the beginning peculiarly conscious. But Wells's luminous consciousness lies curiously in the subjective, rather than in the objective and concrete. Wells knew from the beginning with what he was playing—his material as his goal. He knew perfectly well right from the first time he put pen to paper exactly why men and women did certain things. But he also had that subjective consciousness which implies prophecy. He foresaw with uncanny accuracy the Great War twenty years before it came to pass. He described it even in minute detail. He told us of the "giant fish," the submarine, and of the steel nets in which they would be taken, of the aerial fighting, of the trench warfare, and of the generals sitting behind like chess-players, never coming to the front line. He foresaw everything. Why ? Because he was intensely, though subjectively, conscious.

Many of you will say, " What about Kipling ? " No, Kipling is not conscious. Kipling is for me perhaps nearly the greatest of all English artists as artists, except that he has not got the consciousness of a man like Wells. Kipling is still the supreme, he is still the master. I daresay that there is not a thing that Kipling and I would not fight over if we were in the same room, but Kipling is the greatest artist in " atmosphere," in its turn the central concern of the novel. He is one of the twilight men, however ; he hovers between consciousness and unconsciousness, as you will know, those of you who have the secret, in " Kim."

May I give you another example of the conscious artist—Bennett. Bennett is at his best when he writes about the mediocre, but in those types he shows us the outstanding artist. He tells us all about the little muddling hopes, the little muddling fears, and, above all, the muddling loves of the average man. But even the great conscious ones of literature have to learn just as we all have to learn, because everything in this world goes by gradation. We are all, the biggest of us, pigmies by the side of the cherubim and seraphim, who, despite the irrational rationalists, really do exist. And there are no chasms like the chasms which separate human beings. We are all different ; even in our mediocrity we are intensely different.

I come to Galsworthy. I have watched him many times, watched him eat, watched him talk and " watched him think "—an interesting process. I think this of Galsworthy, for what it is worth, that Galsworthy is an intensely conscious artist inside his own particular field. *The Forsyte Saga* is one of the most intensive, all-embracing series ever written in the English language. His picture of Fleur is a delicate miracle – as is that of Soames. The other day I was speaking to a publisher who, strange though it sounds, actually had some feeling for literature, who thought that Galsworthy's figures were often artificial. I said to him, " God help you ! "

But you never know how people will take a book or a character. I remember some time ago when I wrote the book, *The Isle of Ghosts*, my Irish novel, I sent the proofs to George Russell (" Æ "), and I was quite sure that " Æ " would at once see that these were living men and women. He wrote back : " I have never met in Ireland any of the men and women in your novel." My reply was, " Some of them were taken out of your own drawing-room ! "

I come to an intensely conscious artist, a dangerous artist, a pathological artist—D. H. Lawrence. Let me say that you cannot have it both ways, you English. There are some Scots here, I except you, and also of course exclude the Welsh ; if there be any Irish here, I except them, and I will talk to them afterwards, if they want to fight it out. But you English, for all your quiet lustful compromise, you cannot always have it both ways. You have got an enormous staying power, due to this very passion for compromise, but you have been using it up. You will not learn about other countries. For centuries you have bluffed the world. The Englishman's trousers had the only crease in Europe—immaculate, straight down the centre—but the Englishman cannot always live on his creases. The Englishmen has bluffed the world on his trousers and his face—that set face, with its thrown-out jaw and steady if sometimes rather shallow eye. When Sir Austen Chamberlain went to Rome that jaw and monocled face staggered the Italians, and he " got off with it." Your trouble as Englishmen has been this, you have always managed to sneak through life with a minimum expenditure of vitality. Why, look at the vitality I am expending on you tonight! It would last most of you a lifetime. You have affected a splendid unawareness, unconsciousness to life as it passed you by. You managed to keep up this studied heedlessness, this careful, proud reserve, which carried you through the world.

Then came the War. That was a nasty shock. The war, to use one of the Americanisms subtly, surely supplanting the English language, " called your bluff." And now England has dropped to third place in exports, third place in finance. The point I am getting at in all this is that when all comes to all, having regard to what I have just said about the division of artists as of humans into the conscious and unconscious (all artists are a little un-human), you may, very definitely as a people and with some magnificent exceptions be placed in the category of the unconscious. Read the novels of the greater Russians, and of the greater Germans, and then you will learn things which you have never learned before, and will develop that consciousness which will bring back to you—if you ever really had it the spiritual empire of the world, not the physical empire, which does not matter, not even the intellectual empire—you will never get that, it was always beyond you - but the *spiritual* empire.

But, irritated for an instant into consciousness, you are asking : " What about the great artists that England has produced ! "

England has produced probably more great poets in proportion to her population than any other European country, but the great artists that a country produces have in a sense little to do with the country itself. There is, it is true, an umbilical cord connecting such men as Wells, Kipling and Bennett with England, but in their novels of fantasy, Wells and men of his type are people of whom you think, not as English in one sense--though they are English in another. A country's great artists have little to do with the country itself. Are there any people with less poetry or less sense of the dramatic in them than the average Englishman and Englishwoman ? And yet, as I have said, England has produced this great array of poets, from Shakespeare onwards, and a large number of the finest actors the world has known. Look at Percy Bysshe Shelley ; look at that galaxy of rhymers and rhythmers of the Nineteenth Century. No other country, except Denmark, which has produced some of the greatest poets in the world, writing, unfortunately, in a language understood by few, has produced, to population, so many poets of such rank. The same thing holds true of the great English novelists ; they have often little more than indirect connection with the country in which they are. Bennett is a midlander with a Gallic soul. Galsworthy is, it is true, more or less a product of England, Kipling certainly is not ; he has at times a fantasy that is almost oriental. And I place him in the unconscious rather than the conscious because he is an ape haunted by angels.

Out of this consideration of the novelist in relation to his country follows as naturally as night follows day, the question of inspiration.

Now, what is *inspiration* ? The art of writing great novels is what I must call a demoniacal art. The really great novelist is a man who at times becomes possessed of a demon. This does not necessarily imply anything satanic or sinister. Socrates believed in his demon, and so did Napoleon. *All great creative work is done under the influence of possession.* He often writes things of which he has no consciousness whatever when he is writing them. The man who always knows every word he writes, he is fustian, a second-rate artist. The man who can really write will inevitably have periods when he will not know what he is writing. He will find sometimes on the page before him things of which he had no concept. I know a lady who has written some two million words of a high order during the last six years, and she said, " I scarcely knew a word I wrote until I had finished it. I wrote more or less without conscious knowledge." That is exceptional, of course. But the moment the writer begins to " check himself up," to analyse what he is writing, in that moment he begins to put a halter around fantasy— that is around inspiration. It is only when he has passed the stage of " possession " that the stage of analysis and correction becomes possible and essential.

I have been led into this digression through the mention which I made in passing, of a man who is essentially of the " demoniacal " type, one of the greatest writers of English to-day. I disagree with this man in his realisation of life, but not about its interpretation. His method of thought would be to me in many things, I imagine, quite abhorrent. I believe in artists being in body sound, healthy, men, but in mind often what the great dead average would call " unhealthy." The concept of life of this man would probably be quite different from my own, yet I acknowledge him as a supreme artist, a great man, one of the greatest heritages the English people have, though a great many read him merely because he titillates their sensuous, perhaps more nearly their sensual, feelings but that is not his fault. I refer of course to D. H. Lawrence.

D. H. Lawrence is a tremendous man. Take one of his books, *Kangaroo*, a picture of Australian life. It is a story of modern Australia as D. H. Lawrence sees it. The Australians will not love it, in it they will not recognise themselves (what nation recognises itself!) But it is a great book. May I mention a second book of his, which you should read, *The Plumèd Serpent*. I have lived amongst the Mexicans in Texas; I have been right down to the borders of Mexico itself on my lectures. I have participated in various sides of Mexican life. But I say that Lawrence from his dark and watchful corner saw more of Mexico in one week than I would see in six months. His book will tell you more of Mexico than all the histories and all the scholars.

Let me say this about the scholar. The scholar is the spiritual enemy of the artist, and as Arnold Bennett has said, and said quite rightly, no real scholar can be a true creative artist. The scholar and the artist *are* spiritual enemies. I am not against scholarship, I am not against the patient accumulation of facts and data, but the trouble is that, like the physical scientist, the scholar *will* try to interpret what he is incapable of interpreting. Only the artist can interpret what the scholar has gathered. The moment the scholar puts his clumsy fingers on the interpretation of it, again to make a bull—and every Irishman knows when he is making a bull!—and ceases to be the milch-cow of the artist, he puts his foot in it.

The same is true of the average university professor. Bennett was writing the other day about one man, at least, who has had a close connection with Cambridge University, namely, E. M. Forster, the man who wrote *The Passage to India* and *Aspects of the Novel*, which I believe to be one of the most orginally trenchant books ever written upon the structure and contents of the novel. Bennett, in writing about this man, said that when he saw on his title page (this was some time ago) that Forster was a Fellow of King's, Cambridge, and realised that he was connected with a University, his heart failed him. Bennett remembered a lecture to which he had listened in a University, and said, "I fell asleep," and in the reading of a professional book on the novel, also found himself in a comatose condition. But Forster's book, as Bennett acknowledges, is a penetratingly informative book.

I want to come now to the question of the novel itself, ***what it is.***

The average person in this audience who is thinking of writing—and that means everybody, more or less—imagines that a novel is a kind of thing you make up, like a cookery recipe (something perfectly true of the "popular" novelist), that there is a trick about it, something you can learn, and then do it for yourself.

As a matter of fact, the novelist is the rarest of all geniuses, to apply a word much misused in this country. Let me tell you, first of all, that the novel is a living thing, as much a living thing as the ovum which lives in the womb of a woman and becomes a child. The woman is quite unconscious of it; she could not stop a single heartbeat of the foetus, she does not know how it is produced; sometimes scarcely the method of its physical production- but finally the child is born. The same is true of the novel. The novel is created unconsciously, just as people breathe, but unlike breathing, it means hard work, desperate hard work. Wells himself has written about the despairful work through which a novelist has to go to call forth form out of chaos, which is indeed the business of the "artist"— a banalised word —but what other have we?

The novel is not a trick, nor can anything be learned from the schools. The schools are most abominable things. The schools have destroyed more young writers than anything I can imagine, except that many were destroyed before they began! They are run by people who are failures, not only as artists, but as educators, and the artist-educator is still unborn, though I feel him coming. I can also feel from the vibrations that reach me in this meeting that there are three or four people running schools in this audience, and therefore I will modify my strictures by saying that there may be schools which are exceptions to what I have just said. I have not come across them, that is all!

I want to deal with "story," "plot," "form" and 'style." Here I am going to borrow, not from my own imagination, but from E. M. Forster's book just quoted. Forster shows the difference between story and plot. The story is a narrative of events in time, one after the other ; when plot comes in we get something that I will call " value." Let me give you an example taken from Forster. He says : " ' The king died, and the queen then died.' That is a story. ' The king died, and the queen then died of grief.' That is a plot." That is as simply as it can be put. The story is simply a narration of events one after the other, a bald narration. When we come to a plot we can put value in it. Into the statement " The king died, and the queen then died of grief," value makes its appearance, and the emphasis is on the causality in regard to the queen's death. I think that perfect illustration.

But the hall-mark of genius in Forster's work shows itself when he divides all characters in all novels into two types. He is the first man to say that all characters in novels are either "flat" or "round." A flat character is a character which always acts exactly as you expect him to act. A round character is one which every now and then does something that surprises you. Let me give you an example of flat characters. Dickens' characters are nearly always I speak as a great admirer of Dickens, despite his at times saccharine artistry--flat. Tolstoy's characters, on the other hand, are for me at least, nearly always round, something that I imagine to be true of the majority of Russian characters.

Let me take from Dickens an example. Mr. Pickwick, from the beginning to the end, keeps only one side of his face to you. However much you may try " to catch him bending " he does the same thing all the time. This is true also of Uriah Heep, who, nevertheless, is a vital character. When we come to *Jew Süss*, Feuchtwänger's masterpiece, we have in the Jew himself a character who can do the most generous things and also the meanest things, a beautiful example of the " round " character.

So we come more particularly to the *story*. A friend of mine, one of the best known of living novelists, said to me that the first thing in writing a novel was to think of the story one was going to tell. I deny that it is necessary to tell any story. What is it that gives the great Russians, Tchekov and others, their enormous power ? Is it the story ? The story they tell is often of the slightest, *qua* story. They are able to show a woman coming through that door, walking up to this platform, looking at me, and then going away again, and they make that woman intensely interesting, and even by reflection invest me also with some interest. It is not what you tell that matters—*it is the way you tell it!*

All the great novels are as much psychological analyses as anything else, and above all, they are *philosophies*—philosophy informed by art. The novel is really a philosophic story. (I do not call myself " novelist "—I call myself " artist-philosopher.") The novel that is written without philosophy behind it might as well not have been written at all. But no man must write his philosophy into his story, rather must he let it grow itself. What I am attempting to show is this—that an enormous number of novels are written purely—or rather impurely—to tell an exciting story with a plot, merely to sensationalise and to sell. But they are not " novels." I am not going to say that a great artist will not use a plot. A sound American critic, Isaac Goldberg, has said, " For plot as plot I have a great respect, because if you cannot interest your reader it is no use writing for him " ; but the business of the novelist is not to interest the reader - that is the business of the reader. I say that any man who considers a plot to be an *essential* of a novel knows nothing of the novel. Great artists like Wells can use a plot, but, as we see particularly in Dickens, how often has it not a tendency to hamper them.

Take, again, Virginia Woolf. In a recent " national " list, somebody placed her ninth in the order of merit, with seven men and one woman in front of her. She was really ahead of the woman and of all the men, except four, and in the books of hers I have read there is nothing that I would call " plot." Look at her story, *To the Lighthouse*. It is simply a story of three or four people who want to go to a lighthouse, and she takes the whole book to tell how they got to the lighthouse. At the same time, there is scarcely a sentence or a phrase that does not rivet. Her books are for me of a most tantalizing interest.

Now, ladies and gentlemen, I have said that " plot " and " story " are not essential, often not desirable, but when I come to the question of "style," I come to the most debatable of all the things of which we speak when we deal with novels.

What is *style?* Whole libraries of books have been written on style and in nearly every language. One library of 30,000 books which I saw in America belongs to a woman not very far from Fifth Avenue, who admitted that owing to her "social obligations," she had never looked at any of the books herself, but had done her duty by keeping two librarians to keep them in order. One of her shelves consists almost entirely of books on "style." But the fact is that not a word can really be written about style, for *style is the novelist.* One cannot say that a particular thing is to be written in a certain style. It is the novelist himself who is writing. The writer will inevitably show what he is in his style, as he shows it in his devotions to his gods—especially to our old friend Mammon.

There are modern novels with immense sales written by people who, style or no style, cannot make their characters *live* -the outstanding lack of the modern novelist, as I venture to think. It is not " style " that makes the " best seller." It is something else.

I have read recently between twenty and thirty modern novels, and I could not at this moment recall six characters in the whole of them. I have asked many people from the age of eighteen to thirty to tell me if they could remember, offhand, say, five characters of the novels they have read during the previous few years, and few of them could do so. I have read recently a book by a writer of some pretensions, of which it is stated that over a hundred thousand copies had been sold, but I could not pass an examination in anything that is in that book. What is the reason ? Its characters are dead as dodos. But why, then, does it sell ? I will tell you though I really don't know.

The book in question is the story of a parson who as nearly as no matter does what is known peculiarly in the English novel as "falling." There is nothing that the English novel reader loves so much as a gent in black cloth and white choker who nearly, but not quite, goes over the edge. The temptation of the flesh has still for the English, even in these days after the War, when its indulgence has become so common as to loosen some of the "sex-suppression" under which the English mind still pants, appalling attractiveness. The English mind always flirts around this subject in the novel. The trouble with the book I have just mentioned is that it represents a man who is a cad to himself, to his sweetheart, and to his God, whilst all the time the author of the book believes him to be a hero. Such books owe their success to their treatment of the more flirtatious sides of sex.

We have, again, a book like *Jew Süss.* Do you think that the reason that book has succeeded is because it is fine literature, as it certainly is? Not at all! I will tell you why it succeeded in this country with the rank and file It succeeded, I am inclined to think largely, because of the seductions with which it deals, because it tells of many fleshly adventures. For one person who saw the real genius of Feuchtwänger, and who saw the whole passion of life behind the picture of the lustful, tormented Jew, there have been hundreds attracted to the book by this other side—a side let it be said essential to the other. But no one has ever been able to say really why a novel does or does not sell. When *Jew Suss* was placed on the market here it looked like being a dead failure. The publishers thought it was finished. Then something happened. Somebody wrote about it, and the sales began to pick up. Presently the book began to sell in tens of thousands.

I will give one last example of the public taste in novels.

A man I know, who is doing his best and deepest work at the moment—work by the side of which his previous work bears no comparison—found that his sales had dropped from 120,000 copies to a tenth of that number. He is heart-broken about it, and his latest book, at which the public will scarcely look, is his finest work. The reason is that this work goes below the surface. If an author goes below the surface, especially in matters of love, he will begin to lose his public, for the novel in our day is rapidly passing from a depiction of things as they are to things as people like to think that they are. Robert Blatchford, that fine and sensitive essayist, said to me many years ago, "You know what is troubling the factory girl is not wages or hours; what is troubling her is what the duke said to the duchess in the conservatory after dinner." That applies to the great bulk of the novel readers of the English middle class as well as to the factory girl.

Please do not imagine that I despise the superficial side of writing, as, for example, the crime story (I will not call it "novel"), for nothing is ever lost—not even the garbage that goes to the dust-destructor. I know a great deal more about criminals than I ought, from those who are in gaol and ought to be out, to those who are out of gaol and ought to be in. I have mixed with them. I have been to their haunts in that nursery of criminals—Chicago or elsewhere; some will say even that I have almost become one of them; I have met men and women of international fame, or rather defame, and I say that what you read in the average crime novel has no more relation to the psychology or the motives of these people than with the people seated in this audience.

The same is true of the modern romance, as any of you can prove by noting that nothing which happens to the heroes, and specially to the heroines in the modern romance, ever by any chance happens to you.

What people want to read is chiefly the meretricious. Every now and then a great book does get over to the mass of the public But if any of you are imagining that you are going to write novels, let me tell you to be prepared to give from ten to twenty-five years of your life before you expect to break through to a modest success, and even to do this you will need good health, desperate work, and a greater share of luck than any decent man has any right to expect.

What is the future of the novel? I will make two or three prophecies. Probably they will be falsified in the event, but as neither you nor I will live to see the event, that does not matter.

The novel of the future will leave plot and mere story and pass more and more towards philosophy. Novels in the future—already the tendency is beginning to show itself—will, I think, divide themselves more and more definitely into two classes. One will be the purely realist novel, the other will be the novel of fantasy, with which I have not dealt, purposely, in this lecture, for it would take a lecture in itself. Stark realism and fantasy, of those twins, one heavenly, the other unheavenly, the future novel will be born. There is also creeping into the modern novel, particularly in that of the post-revolutionary Russians—as, for example, in works like *Cement*, by Feodor Gladkow, a book extraordinary to a degree—a new technique, starkly effective, despite its recitativeness, for whatever may be the art of the novelist, it is assuredly not recital.

Art is art—it is not reality—and *the art of the novelist is intensely artificial* if it may be put in that way. The author has to give to his characters that intangible thing called art, if they are to come alive—he has to use artifice. Art is like the wind, no man knows whence it comes or whither it goes. No man can say it is here, or it is there—but each one of us knows *when* it is. Nor can it suffer control. The imagination of the artist is not amenable to control of any kind; he is always an anarchist, for the imagination is purely an individualist thing and there are no rules for art. Imagination has nothing to do with democracy as we understand it. Imagination is aristocratic now and for ever.

And if you still ask me to tell you more precisely what is the future of the novel, my reply is that if I could tell you that, I could tell you the future of life itself. For life and the novel are one and the same thing!

CANTOR LECTURES

WIND INSTRUMENTS FROM MUSICAL AND SCIENTIFIC ASPECTS

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I hope I have made it clear in the preceding pages that the makers of wind instruments and builders of organs have found their way to the present stage of evolution of their products via the thorny path of trial and error. Science has lagged so lamentably behind in applying itself to the problems involved in this trade, that at present one can do little but dot the i's and cross the t's of the manufacturer with a view to indicating the possibilities of applied physics in this direction. In the last lecture I described what science has to say in regard to the function of the mouthpieces of the various instruments ; I shall now consider the properties of the tube and contained air, and their relations with the maintaining force at the mouthpiece in the complete instruments.

The type of vibration which takes place in an open pipe sounding its lowest or fundamental tone is very similar to that of a spiral spring rigidly fixed at its centre. If I take a brass wire and coil it round on a pencil as former, and clamp the spiral spring so formed at its mid point, then on pulling the two free ends out and away from the centre and letting go, the individual turns of the spiral go through evolutions of the same character as the individual particles of air in the pipe. The motion is then longitudinal, they move in and out along the axis of the pipe, with an amplitude diminishing from a maximum at the two free ends of the pipe, down to nothing at the centre. A place where the motion is nil is called a *node*, and where it is a maximum that place is called an *antinode*. The open end of a pipe—strictly speaking, a little outside the open end—is always an antinode ; a closed end is always a node ; but we may have any number of intermediate nodes and antinodes provided they are alternately spaced and equidistant. The pitch of the note given is inversely proportional to the distance from a node to an adjacent antinode. Thus, both the column of air in the pipe and the spring which imitates it can vibrate in segments with two nodes as well as the terminal antinodes. The distance from node to antinode is now a quarter of the pipe length instead of the former half, and the note is the octave of the fundamental. Further sub-division results in the twelfth, then the double octave, so that the whole of the harmonic series based on the fundamental tone of the pipe is available, not only singly, but in a combination of these tones.

To imitate the stopped pipe we must clamp our spring at one end and let the other end oscillate freely. We shall now find that in the fundamental mode of vibration we have a node at one end (the fixed or stopped end), and an antinode at the other, the distance from a node to the adjacent antinode being the complete length of the pipe. The fundamental pitch of a stopped pipe accordingly lies an octave lower than in an open pipe of equal length (only approximately for a reason which will be stated in a moment). On the first subdivision of the column into segments, an additional antinode must arise at one third of the length from the stop, and a fresh node at two-thirds down. The pitch is a twelfth of the fundamental (i.e., thrice the fundamental pitch). The next subdivision produces a tone of frequency five times the fundamental. Thus a stopped pipe can give only the odd members of the harmonic series, instead of the complete array of harmonics of the open pipe. This has an important bearing upon the quality of the complex note given by the column of air, for it is a well established fact that the ear distinguishes the timbre of the sound from an instrument by the number and relative intensity of these overtones which are mixed with the fundamental.

The organ builder names the pitch of the stops of pipes relative to the keys on the console by the approximate length of an open pipe at the lowest note of the manual. The length of such on this bottom key (two octaves below middle C), is approximately 8 feet. Thus an 8 foot stop indicates one which sounds at the same pitch as the key pressed. A 4 foot stop of open pipes would have only half the length of the above, and would sound the octave of the key-pitch. If, however, these stops were of closed pipes, the actual length of an 8 foot stop would be only 4 feet at the low C.

In order to emphasise the timbre of certain pipes and to create artificial tone-colour, the builder introduces *mixture* stops. These have several pipes to each key, whose pitch relation is in the order of the natural numbers, 1, 2, 3, etc., all sounding together when the one key is pressed. In experimenting with mixture stops it must be borne in mind that each counterfeit overtone is not a simple tone in itself but has its own timbre, so that the actual effect is of the superposition of several *complex* notes whose fundamentals are members of a single harmonic series. To create artificial timbre by admixture of known proportions of members of the harmonic series, it is necessary to employ simple tones. The nearest approximation to this would be a series of tuning forks with frequencies in the ratio 1, 2, 3, 4, etc.

When a flue pipe is overblown, the tone of the pipe accommodates itself to the higher pitch of the edge tone, if it can, by jumping to one of these harmonics. The effect of increasing the wind pressure upon an open pipe—in the absence of a roller across the mouth—is to send up the pitch to the octave of the fundamental at which frequency the edge tone becomes coupled with the pipe, which must now gain an additional antinode at its centre. On some instruments, and on some organ pipes, a vent-hole is provided at the appropriate point, to encourage the overblown note. This is the characteristic of a flue stop on the organ called *harmonic flute*. The pipe is narrow, and twice the length of an ordinary open pipe sounding the same note, but by means of the antinode hole bored near the centre, and a greater wind pressure, the pipe overblows to the octave, with a timbre closely approximating to the orchestral flute. On a stopped pipe this hole would be provided at one-third of the length from the stopped end, and overblowing would produce the twelfth of the fundamental.

Yet a third pipe will be found in many instruments, viz., the cone. For reasons which are beyond the scope of this lecture, the cone, even if closed at the narrow end, behaves like the open pipe and gets the full series of harmonics. The difference between the cone and the closed pipe is connected with the fact that the sound waves in the cylindrical pipe are plane, whereas in the cone they are spherical. This gives the mathematical treatment a different aspect and leads to the above result, which can be readily verified by experiment.

There are a few other special shapes of tubes used on flue organ pipes which deserve mention here. I have already mentioned in the first lecture the bottle shaped resonator blown like a flute. The *flute-a-cheminée* has actually a chimney sticking out of the stopped end, of about one third the diameter and one third the length of the main pipe, which converts it virtually into an open pipe with a sudden change of cross-section three quarters of the way up. The theory of these two pipes has been worked out. The peculiarity of the timbre of the latter seems to be a predominance of the fifth harmonic.

Now, whereas a stopped end of a pipe is exactly a node, it is not correct to say that an antinode is flush with the open end of a pipe, for it is found in practice that the vibrating motion of the particles has a maximum amplitude at a point outside the pipe. The distance of the antinode beyond the end is greater with wide pipes, being in fact a constant fraction, about two thirds, of the radius in the case of an unflanged pipe. This " end correction " as it is called, must be added to the speaking length of all pipes having an open end, and there is also a similar but less certain correction at the mouth of flue pipes, which depends upon the area of the mouth. The effect of this is, that if I take two open organ pipes of the same length from upper lip to upper end, but of different width, the one of wider bore sounds flat to the other, when I sound them successively. It is also found that a narrow column of air can more readily break up into vibrating segments, and so is more readily overblown ; indeed, it is difficult to retain a long narrow pipe at its fundamental tone. This sets a limit in the bass-ward direction to which the range of a narrow-tubed instrument like the orchestral flute can be pushed by extending its length.

One other matter remains to be discussed before we consider the orchestral wind instruments in turn, and that is the possible effect on the timbre exerted by the material of which the pipe or tube is made. To the extent that it is the column of air, combined with the edge tone or reed at the mouth, that produces the sound, it should not matter what the solid envelope of the column of air is made of. Mr. B. H. Tompkins has recently constructed an organ in which the pipes are made of paper, while toy instruments made of papier maché can be bought in shops. The acoustical objection to the general adoption of such a casing is, that it is liable to waste the player's or blower's energy, weakening the tone of the column of air by itself taking part in the vibration, which would not indeed be objectionable if it were not that the vibration of such substances is highly damped, and consequently a lot of energy is lost in friction between the particles of the substance. With a view to increasing the rigidity of the enveloping tube, many wood-wind specimens are now being made of metal. Care has to be exercised that such a rigid body shall not have resonant frequencies lying close to one of the notes of the column of air, otherwise the tube will vibrate in sympathy with the air when this note is played, producing an unpleasant sound. Whatever the material used, there is no doubt that it does play no mean part in determining the timbre of the instrument, favouring certain regions of the musical scale to the detriment of others.

The modern orchestral flute is deserving of the closest attention, as it is upon the improvements made in this instrument early in the nineteenth century that the mechanisms of all wood-wind instruments are based. These improvements centre round the name of Theobald Boehm, a German musician and metal worker, who in 1832 constructed his improved flute, which has remained, with slight modifications, the pattern for flutes up to this day. Some of these improvements are said to have been stolen from a flute which Gordon in England had devised and subsequently shown to Boehm, but at any rate between them they revolutionised the construction of flutes.

In the first lecture I traced the development of the flute up to the stage where it had received a number of extra keys beside the seven original thumb and finger holes. The defects of such a system are :—first, that the size of the holes is dictated by the size of the fingers which have to cover them, and second, that they must be placed in such a position that they can be quickly and naturally covered by the fingers, without mutual interference, and leave the remaining fingers unhindered to operate the extra keys. Boehm (or Gordon), asked himself the question, why must holes be covered directly by the fingers at all, since with the keys we have a means of placing the holes where we please, and operating them from any convenient point by levers ? The upshot of this inquiry, after several years of empirical experiment, was the evolution of what is called the new Boehm system flute, in which every hole is closed, when required, by a key, although it is true that some of the keys are provided with pads pressed directly down upon the holes by the fingers.

This instrument had fifteen holes of much larger diameter (average 13 mm.) than formerly, with clutches which could cover more than one hole at a time, so that the thumb of the left hand and eight fingers sufficed to control the whole range from middle C up to the A in the third octave above by successive overblowings and cross-fingerings. Boehm found the position of the holes empirically. The science of this subject has now advanced far enough for the size and position of note holes for a given pitch to be calculated from theory in advance of construction. I regret that time does not permit me to expound this matter, but I may, perhaps, be allowed to refer to a recent book of mine on the Acoustics of Orchestral Instruments, in which the calculation of note holes and their fingering is worked out. Another feature of the Boehm fingering is the possibility to trill a note, i.e., to alternate a note rapidly with its neighbour of a tone or semitone higher. Where the rapid change cannot conveniently be made between the normal fingerings for the two notes, a special trill key is added for convenience.

These keys were different in form to their predecessors, being models in miniature of the roller and tracker action on the organ. The roller is a metal rod fixed longitudinally at the side of the series of note holes, and is free to rotate in plain bearings fixed to the wood or metal of the flute. To this axle any number of pads to cover holes can be attached, jutting out at right angles, with a corresponding lever for the finger to operate at any convenient point. In the earlier model there were ring-shaped digitals which surrounded some of the holes, so that the action of covering a hole by a finger simultaneously brought into action a key which closed another hole which was necessary for correct intonation. On the final model these rings were all filled in by shallow cups for the fingers, but rings may still be seen on the modern clarinet mechanism.

But the key mechanism was not the sole betterment which Boehm brought to the flute. He also made experiments on the shape of the bore. I quote from his book, published in 1871 (Prof. D. C. Miller's translation) :—" The most desirable proportions of the air columns, or the dimensions of the bore best suited for bringing out the fundamental tones at various pitches, were soon found. These experiments show :—

1. That the strength, as well as the full, clear quality of the fundamental tones, is proportional to the volume of air set in vibration.

2. That a more or less important contraction of the upper part of the flute tube, and a shortening or lengthening of this contraction, have an important influence upon the production of the tones and upon the tuning of the octaves.

3. That this contraction must be made in a certain geometrical proportion which is closely approached by the curve of the parabola.

4. That the formation of the vibration nodes and tone waves is produced most easily and perfectly in a cylindrical flute tube, the length of which is thirty times its diameter ; and in which the contraction begins in the upper fourth part of the length of the tube, continuing to the cork, where the diameter is reduced one tenth part."

I may remark that the scientific object of tapering the bore towards the mouth hole is to keep the timbre more or less the same by giving the upper notes of the range, which use the near portion of the tube mainly, a narrower bore so as to keep the ratio of width to sounding length nearly constant. This contraction—we need not assign any precise scientific significance to the parabolic shape—has the demerit of putting some of the overblown tones out of tune to the lowest octave, for a contraction in a tube has more effect according as it is near or far from an antinode of the sounding column of air. To overcome this faulty intonation, the cork which stops the little cavity in the end of the tube beyond the mouth hole can be adjusted in position to get the best possible tuning between the various registers of the flute. This is but a partial remedy, but, as I have explained, the flautist can pull the flute into tune, by working upon the edge tone at the embouchure.

The timbre of the flute is characterised by absence of harmonics, giving out a hollow, coldly pure quality, particularly in its lowest octave when played softly.

In the upper registers, i.e., when overblown, it becomes brighter and at the top, piercing. In the orchestra it is characterised by its agility, made possible by rapid striking of the lips by the tongue between each note, and by the simple fingering. It blends well with the oboe and bassoon either in unison or in separate parts. Among scores showing the use of the flute which will repay study Tschaikowsky's *Danse Chinoise*, Mendelssohn's Scherzo from the *Midsummer Night's Dream*, and Saint Saens' *Rouet d'Omphale* may be mentioned.

The modern oboe (Fig. 16), now has a conical bore of small angle and also begins at middle C. The reed is always at a node of the vibrating column of air, but owing to the conical shape, over-blowing produces the octave first, subsequently the twelfth (*vide supra*). Consequently the fingering is very like that of the flute. To aid the overblowing two vent-holes are provided to encourage the formation of antinodes at the average position at which they are required. These are uncovered by " speaker keys."

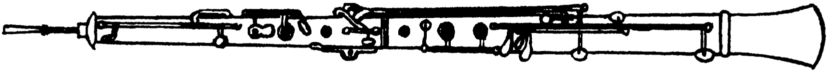

FIG. 16.

The oboe is characterised by the reediness of its tone due to a very complete retinue of harmonics, although this is not so conspicuous as it formerly was. The same is true of its larger brethren, the cor anglais and the bassoon. One of the defects of construction of many bassoons is that some of the holes are left for the fingers to cover directly. This means, that not only the orifices are small, but actually that the holes are bored obliquely through the wood to bring the outer ends into a convenient position for the fingers. This makes the quality weak, and the speech uncertain, owing to the friction imposed on the air vibrating in a long thin channel. These holes should all be worked through keys, and made wide to be covered by large pads.

These double reed instruments are essentially melodic. In combination they tend to cut through the remaining tone mass unless heavily supported. As examples of the use of the oboe, I may refer to the second movement of Schubert's *Symphony in C Major*, Grieg's *Morning* (*Peer Gynt*). The score of Tschaikowsky's *Pathetic Symphony* shows some admirable instances of the effective use of the thick reedy tone of the lower notes of the bassoon. Instances of the rather unfair use of the bassoon as comedian are too well known to need citation.

The cor anglais has found favour with modern composers to fill in the middle of the harmony of the wood wind. It has a delicate timbre and imparts a melancholy tint to a score, which is not obtainable by any other instrument. Wagner and Strauss are very partial to it, and although it is not employed usually in extensive solos, the former has written a beautiful and famous solo for it at the opening of the third act of *Tristan and Isolda*.

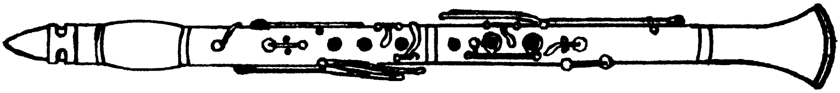

FIG. 17.

The clarinet (Fig. 17), is the archetype of the beating-reed wood wind. The reed—which is, of course, single—is made of a piece of cane about a centimetre wide, shaved down from about two millimetres thickness at its fixed end to knife-edge fineness at the beating end. It is held in position by a double metal band or ligature, which may be seen in the extreme left of the drawing—the reed is behind—so that it covers a slit almost as wide as the reed in the beak, which widens out rapidly into the body of the instrument. From the ligature to the bell the bore is cylindrical. The bulge which is seen on the right of the mouthpiece joint is merely ornamental and not copied inside the bore. As the reed forms a node of the column of air, the clarinet behaves like a stopped pipe. The three main consequences of this are : firstly, that the quality is characterised by the absence of the even harmonics, i.e., those that are present bear the pitch ratios 1 : 3 : 5, etc. ; secondly, length for length, it sounds an octave lower than the oboe, and thirdly, that the first over-blowing produces the twelfth of the notes obtained by using ordinary pressures. It follows from the second of these statements that the fingering is different to that of an oboe, and that note holes to cover an octave and a fifth must be provided before the scale can be repeated, using a vent hole to aid overblowing. The vent hole is that under the first key from the beak in the drawing, which is worked by the thumb from the back. The clarinet is the easiest reed instrument to blow. The player folds back his lips over his teeth, and inserts the beak between the folded lips. The reed is then set in motion by striking it on the lower lip with the tongue. The fingering however is more difficult to learn, owing to the fact that the same note in the two lower octaves is not produced by the same combination, as on the other wood wind instruments.

The tone of the clarinet in its lower register—called chalumeau, after its obsolete predecessor—is very broad and limpid. The clarinet was formerly used entirely in its upper range, on a plane with the flute and oboe, where it is more harsh and strident. It was Weber who discovered the possibilities of the lower notes and he wrote Concertos which ably show off the paces of the instrument. I have before remarked that the clarinet is a comparative new-comer to the orchestra, but it now forms the mainstay of the wood wind, particularly in military bands. It is unfortunate that the bridge notes between the lower octave and the first over-blowing are weak. This is because they are formed in a short length of wide tubing near the mouthpiece. Probably a little tapering could be introduced here without detriment to the rest of the scale of the instrument.

Clarinets are made at a number of different lengths ; they are, in fact, transposing instruments. The clarinet becomes awkward to manipulate when there are more than three sharps or flats in the key signature. The clarinettist provides himself with two clarinets, one playing a whole tone lower than the notes printed in his copy of the music, which he fingers to obtain, and the other plays three semitones lower. If the composer transposes the clarinet part either a whole tone or three semitones above the actual sounds, it is possible to provide the player with music in a key signature, which need never involve more than four sharps or flats, and usually fewer. There is also a bass clarinet in use.

It is said that it was in an experiment to construct a clarinet which would overblow to the octave that Sax in 1840 invented the *saxophone*. The saxophone is, in fact, an oboe provided with a clarinet reed and mouthpiece. In Fig. 18 is shown the soprano member of this family. It lacks the bends of the tenor variety with which we are more familiar—perhaps too familiar nowadays—but my object in depicting the straight saxophone is to invite comparison with the other two figures which illustrate this lecture. The tube is always of metal and the angle of the conical bore is larger than that on the oboe and bassoon. Deprived of its key apparatus, its form bears a closer resemblance to the usual organ reed-pipe, than does any of the orchestral wood wind. One feature of the modern saxophone which is acoustically admirable is the large holes and pads provided for the lower notes, such as the last one on the right of our figure. This ensures strength and certainty in the production of these lower notes.

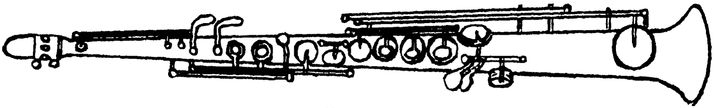

FIG. 18.

The saxophone has a peculiar whining but not unpleasant tone, which, judging by its comparative rareness in symphonic scores, does not blend well with the rest of the orchestra. The rather halting speech of the saxophone I should ascribe to the inevitable constriction between the wide beak (essential with a clarinet-type reed), and the narrow entrance to the apex of the cone. It has, however, long been used in French military bands, where the clarinet would be used in England ; it has also been used by modern French composers, by Bizet for example (*vide* Suite I, *l'Arlesienne*) in solo work.

Turning now to brass instruments proper, it is necessary to explain the working of the pistons and crooks which are characteristic of all these instruments nowadays, except the trombone. The old natural horns and trumpets could employ only the notes of the harmonic series based on the fundamental of the tube, by successive overblowing—and not many of them could be attained in practice. The first means of varying the length of the horn were the *crooks*, pieces of tubing let into the main bore of the instrument to increase its length, and so to transpose the available notes a semitone or more lower. At present these are literally crooks, U-shaped pieces of tubing like small trombone slides let into the middle of the column, but in those days they were straight pieces of cylindrical tubing interposed between the mouthpiece and the horn itself. When a number of short sections were thus introduced—and probably the joints were none too perfect—the intonation was faulty, and the tone liable to jump from one harmonic to the next. To Hampel of Dresden we owe not only the modern form of crook, but a quick means of changing from one harmonic progression to another based on a lowered fundamental. It should be clear that the crooks are not handy for making this change during the playing of a solo for example, as the most agile horn player would require ten seconds to make the change! But by introducing the hand into the bell, the player can shift the antinode to a point such that the resulting fundamental is lowered either a semitone or a whole tone according to the extent of the "brassing," as it is called. These brassed notes can be fabricated while playing, and though not suitable for rapid execution, by their aid the player can nearly bridge over the gaps in the harmonic scale.

The valve was invented by Blümel in about the year 1813. At first it was a single piston valve, which brought into use a crook. It was intended to be permanently up or down during the playing of a piece, but finding that the valve could be opened or shut at least as readily as the hand could be pushed into the bell, Stolzel, who was marketing Blümel's device, made a chromatic trumpet having two piston valves intended to lower the pitch of the fundamental through one or two semitones at will; to do in fact for the trumpet what Hampel's brassed notes had done for the horn.

Most brass instruments now have three pistons—the tuba has four—which when depressed add to the column of air the section contained in a little coil of tubing to which they give access. It will be appreciated that the player can, by the use of two or more pistons, find any note of the equi-tempered scale as a harmonic to one or other of the fundamentals corresponding to the tube-lengths available. This will not be true of the region of the gamut in the neighbourhood of the fundamentals themselves, owing to the harmonic series being spaced out so widely at this level, but that does not matter as a brass instrument is always played well up in the harmonics, and never—or hardly ever—is the fundamental asked of it.

In order to lower the pitch of a pipe by a given interval, its length must be increased in a certain *geometrical* proportion, but if two valves or two crooks are employed together, a certain fixed length is *added* to the tube, which is not the same as multiplying the original length by a certain fraction. This means, in practice, that the lowering of pitch produced by two pistons employed simultaneously is not equal to the sum of the lowerings which each could effect if used separately. To get over this inconvenience, compensating lengths of tube are automatically introduced, when more than one valve is depressed.

The beautiful soft tone of the French horn must be ascribed to its funnel-shaped mouthpiece, and wide-angled conical bore, giving the full series of harmonics, but neither the mouthpiece nor the bore are of the shape to give prominence to overtones in the timbre. The note of the horn is the most flexible of all the brass, for the resonances of its column of air are not so sharp, and as I remarked in the last lecture, the edge tones are not definite. This makes the task of the French horn player a little harder, but the instrument is more readily corrected by him for temperature, or for any other effects which may put it out of tune.

The tubes of brass instruments are not usually uniform cones, but the extent of widening increases from the throat along the tube, ending in a flourish at the bell. This is particularly true of the French horn, which can be seen in exaggerated form on gramophones and loud speakers. To show how the widening of the horn affects the resonances, I will take an ordinary loud speaker, and supply the unit at its throat with alternating current at gradually rising frequency. As it is a good loud speaker, you will not notice any marked resonances as I take it up the scale, except possibly low down in the bass. The response is nearly uniform; if it were not so, of course, the music reproduced by it would be distorted. I remove the horn of the loud speaker, and replace it by a trumpet of approximately the same length, but of small angle, and only three inches wide at the bell. On taking this through the musical scale you will observe that there are marked responses at certain frequencies, where the tube seems to shout at us, whereas the amplification is small in between. Higher up the scale the resonances get closer together, for they form, of course, the harmonic scale of the column of air in the trumpet.

By its quiet tone, the French horn acts as a bridge between the wood wind and the more strident brass, and will often be found completing the wood-wind harmony; an example of a solo horn accompanied by the wood-wind will be found in the Andante of Mendelssohn's *Midsummer Night's Dream*. Quartets of horns are common, especially when imitating hunting horns; see, for example, the opening of Rossini's *William Tell*. For such passages natural horns should be employed, if available, as the chromatic French horn has its expanding continuity broken by the insertion of the—necessarily cylindrical—sections introduced by the valves and crooks. Some have complained that the tone of the old horn has been rendered more "trumpety" by these innovations. The commonest French horn has a fundamental of F, two and a half octaves below middle C, and is nearly 12 feet long.

The valve trumpet is cylindrical for a considerable portion of its length, and then curves out, ending in a moderate flare at the bell. I have earlier ascribed its characteristically blatant blare to the narrow bore and definitely cupped mouthpiece. This necessitates care in its management, for the edge tone at the mouthpiece has to be nicely adjusted to the note of the column of air. It was, no doubt, this difficulty which led to the introduction of the cornet, which has a shorter and wider expansion, is easier to play, but not so brilliant in tone, though the trumpet is returning to favour, even among amateurs. Both pieces employ the scale for two octaves above middle C, while the valves can take them a few tones lower. They can vary their tempo from the slowest of solos to rapid tongueing, and on account of the aid given by resonance can be used at fortissimo intensity for a considerable period without rest. Besides its employment in tutti to give more intensity, it has been used in fanfares and solos of a fanfare character, beginning with the famous one in Handel's *Messiah*. Besides the ordinary chromatic trumpet, there is a miscalled ***Bach trumpet***, in which the tube is uncoiled, except where it is broken for the insertion of the three valves. It appears to have a more brilliant timbre, and is acoustically interesting, as it resorts to the old form of tuning crook, i.e., a straight section inserted at the throat.

To mute the trumpet a hollow pear-shaped piece of metal is inserted point foremost into the bell. As this would lower the pitch of the instrument if completely closed, a hole is bored axially through it, of such dimension that the position of the antinode is unchanged, although the sound is stifled. Wagner introduced a new quality into his operas by having closed mutes introduced into the bell, and directing the players to blow hard. This gives a peculiarly raucous and metallic timbre, besides lowering the tone of the instrument in more senses than one. At any rate, this artifice has been taken up with avidity by present day composers of trivial music. For the more legitimate use of the muted trumpet, the score of Debussy's Symphonic Poem *La Mer* will repay study.

When the serpent and ophicleide fell into disuse, the brass lacked a bass. This gap was filled up by the resourceful Sax, who was an adept at taking part of one instrument and grafting it on to another. In this case he took a large horn and gave it a trumpet mouthpiece. The result of this cross breeding was the *saxhorn*, of which a larger specimen is now in use, and is called *tuba* or *euphonium*. The deep cup mouthpiece (of Fig. 15 of the preceding lecture), gives an edge tone of deep pitch to assist the maintenance of the pipe tone, but the latter is flexible, as the expansion is large. In the form made familiar to us by the Army bands, the tube of the instrument winds round several times in an oval coil, finally emerging in an upward-pointing bell. Their dignified tone was valued by Wagner, to whom we owe their general adoption in the orchestra.

Of the wind instruments in everyday use in the orchestra, there now remains only the trombone to portray. As I noted when speaking of the sackbut, we have here quite a different principle to bridge the gaps in the harmonic sequence. The slide is, in fact, a long crook which fits into two parts of the trombone tube—practically cylindrical except at the bell—in such a fashion that it may be rapidly slipped in or out to a greater or less extent, without allowing a leak of air at the joints. On the ordinary trombone the player can vary the fundamental over a sixth below low C in this way, and has the harmonics of an infinite number of fundamentals lying in this range at his disposal. Actually the slide is employed in seven positions only, but these are not fixed, as the trombonist can, like the violinist, adjust his notes automatically for pitch. This is the only wind instrument able to do so. Another faculty is that of passing *continuously*, instead of by steps of notes, from one note with the tube pushed in, to another with it extended. This *portamento* playing is another effect beloved of composers of jazz music. The quality of the trombone is not unlike that of the trumpet though less brilliant. Being practically a stopped pipe, the even harmonics are not prominent. It is played with a cup mouthpiece of about the same size as the trumpet in England, as the main requirement of the composer is power, but on the Continent a somewhat wider bore, and a blunt edged mouthpiece is used to obtain less bark in the tone. The

Prologue of Boito's *Mefistofele* is a good instance of the noble treatment of the trombone.

The bass trombone outbids the tuba in popularity as bass to the brass wind, and was used as this alternative by Wagner, who was particularly fond of this in quartets of trombones of various sizes. On these larger trombones the full stretch of the slide cannot be conveniently managed with the arm, and a handle something like the handle of a lorgnette is added. A fixed crook may also be found in addition to the movable one, so that the instrument stands in two keys.

I cannot conclude without expressing my thanks to those who have made the demonstrations possible by lending instruments for these lectures, particularly to Canon F. W. Galpin for the specimens from his unique collection of early English instruments ; to Mr. Henry Willis for the organ pipes ; and to the firm of Hawkes and Son, and Messrs. Pausey and Colborn of that firm, for bringing examples of modern orchestral instruments.

OBITUARY

SIR LAWRENCE WEAVER, K.B.E., F.S.A.—The sudden death of Sir Lawrence Weaver, K.B.E., will be a serious loss to all the Arts, and is especially to be deplored at the moment, when his clear business mind was so invaluable to the causes for which he stood. He was not a Fellow of the Royal Society of Arts, but was greatly interested in their efforts to preserve the beauty and orderliness of our towns and villages. When he was last in America, he undertook to speak on behalf of the Cottage Fund of the Society, and it was largely due to his interest that the village of West Wycombe was purchased. Only a few days ago the Secretary had a letter from him indicating that, much as he would like to come on the Council and assist the work of the Society, he was already committed to so much work outside his own business, that his doctor advised him not to undertake anything further.

Sir Lawrence Weaver was born at Bristol, and educated at Clifton College. His death in the prime of life and energy will provoke many fundamental reactions. If circumstances had permitted a less strenuous life in the beginning, and indeed all through, would his career have been strangely different ? All who knew him well realise this, as he possessed capacities that would emerge in any department of life that needed a leader—the capacity that burnt itself out in any line of activity. In these days of general bankruptcy of personal force in so many departments, and especially in the political world, one wonders now how far he might have gone in the more general arena of politics. In the business world his influence from the first was vital—his quick mind realised that the creative artist must be behind all forces of progress, and that he was a perfect agent of co-ordination. He loved success and the manipulation of men and causes. But behind all this he always hesitated, and wondered what it meant and how far it was worth while. It was in these hesitancies that the real Weaver was known to his friends, as such disclosures could not be made to the business world he impressed. He loved to recall that he, a well-educated public schoolboy, started as a traveller in builders' ironmongery. How quickly he made this work the instrument of a personal touch with all who were doing interesting work in the Arts, especially constructive work, which appealed to his orderly mind! To his work on *Country Life*, as architectural editor, this country owes much of the renewed interest in the art of building. He died at a moment when the air is full of new problems, all of which he was ready to face fearlessly, but which were agitating a mind quick to see the dangers of an ill-considered break with traditionalism. He saw clearly that the new world of mechanical forces must be harnessed to an art expressive of its purposes, but saw no guiding authority to control its expression. The biographer of Wren thought that we ought to be able to produce an English vernacular expressive of new forms of construction. Sir Lawrence Weaver's last public appearance was at the Royal Society of Arts at an exposition of the result of uneducated display in the world of advertising, and he provoked a discussion, the influence of which was felt at once. His going was as dramatic and incisive as his life, and if the story of this is rightly told it will remain a continual inspiration to a country which was never more in need of such an exemplar of inspiring initiative and personal character.

NOTES ON BOOKS

APPLIED CHEMISTRY: A PRACTICAL HANDBOOK FOR STUDENTS OF HOUSEHOLD SCIENCE AND PUBLIC HEALTH. By C. Kenneth Tinkler, D.Sc., F.I.C., Professor of Chemistry in the University of London; and Helen Masters, B.Sc., and King's College Diploma in Household Science, Head of the Domestic Science Department, Battersea Polytechnic. Vol. I. Second Edition Revised. London: Crosby, Lockwood & Son. 15*s*. net.

From the (undated) preface to the first edition of this text-book, here reprinted, we learn that it is intended for the use of students in their third and final year of reading for the University of London Diploma in Household and Social Science; and, from the preface to this edition, that the degree of B.Sc. (Household and Social Science) has been substituted for the Diploma referred to above. It appears that the basic intention of this book is the provision of an appropriate practical course in Applied Chemistry, and that the theoretical aspect of the subject is dealt with in the lectures in Applied Chemistry at King's College for Women; but "in some cases a certain amount of theoretical matter has been introduced."

In actual fact, however, the book is far more than a laboratory hand-book, a large amount of general and theoretical description being given on every subject dealt with. This makes the value of the work extraordinarily difficult to assess, because the theoretical treatment, considered on its own merits, is very incomplete, and even scrappy; but we have to remember, at moments when this becomes most apparent, that the same subject is presumably fully treated in the lecture course. Thus in the chapter on gaseous fuels, though it includes several pages of matter relating to gas fires, this matter contains no reference to precautions against the escape of fumes, nor to those flueless types of gas fire which claim to prevent such escape, nor even to the physiological effects of carbon monoxide inhalation.

No doubt some such difficulty is inherent in the planning of a text-book dealing with this markedly heterogeneous subject, and could be overcome only by the publication of a separate text-book on the theoretical side, in which event much of the contents of the present volume would naturally be omitted.

The subjects examined cover a very wide range, and much of the information given would prove of great interest to the general reader. More than half the book will be found to have a definite, though by no means an exclusive, application to laundry work: water, its analysis and softening; soap and detergents; textile fibres and fabrics; bleaching agents and the removal of stains; dry-cleaning by means of various organic solvents. The practical work under these headings consists partly of experiments illustrating fundamental principles, and partly of the chemical analysis of various commercial preparations.

Air analysis, hygrometry and ventilation problems are next discussed, and are followed by two chapters on gaseous, liquid and solid fuels. A useful section on fire extinguishers is included under this head, as is also (rather less expectedly) the chemical examination of coal-tar disinfectants. One is reminded by this last that the chemical aspects of domestic medicine do not receive much attention in this volume, but obviously it is no easy matter to delimit the frontiers of such a subject as Household and Social Science.

A final chapter on the protection of wood, metal and other surfaces contains much valuable miscellaneous information. The subjects dealt with are paints and varnishes, metal polishes, furniture polishes, and glazes and enamels on pottery and metals.

Architectural Drawing. A practical handbook. By G. D. Gordon Hake and E. H. Button. London: B. T. Batsford, Ltd. 10*s*. 6*d*.

This little book is a valuable addition to Messrs. Batsford's architectural library. The student's outfit having been dealt with, the authors proceed to graphics, and give a most clear account of how orthographic projections are to be obtained. Their chapters on isometric projection and perspective are no less lucid, and they make it easy to understand how to treat shades and shadows.

Lettering is not neglected; the authors point out the utility of this art in educating the hand and eye. The chapter on sketching is well illustrated with drawings of various kinds that agreeably express the individuality of the building shown, or of the artist, or of both.

The importance of sketching needs emphasis. Of technical ability in our mechanical age there is no lack. It is experience, taste, the value of tradition— not so much in principle as in performance—which need to be better understood. Architects, artists, designers, need more leisure to travel, and their employers should realise that it is grossly uneconomical to forbid those who serve them to learn the lessons which the past can teach.

"Architectural Drawing," which is well printed, and bound attractively in black and green, should be found encouraging by students, and so doubly helpful.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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Monday, January 20..Architects, Royal Institute of British, 9 Conduit Street, W. 8.30 p.m. General Meeting. President's Address to Students.

East India Association, at Caxton Hall, Westminster S.W. 4.30 p.m. The Right Hon. Viscount Goschen, "The Working of the Reforms in Madras."

Electrical Engineers, Institution of, at the University, Liverpool. 7 p.m. Discussion on "Low Temperature Carbonization of Fuel with special reference to its Combination with the Production of Electricity." Introductory papers by Messrs. E. H. Smythe and E. G. Weeks (English Practice), and Mr. S. McEwen (American Practice). Joint Meeting with the Liverpool Engineering Society.

At the University, Edmund Street, Birmingham. 7 p.m. Messrs. T. W. Ross and H. G. Bell, "Recent Developments in the Protection of Three-Phase Transmission Lines and Feeders."

Geographical Society, at Lowther Lodge, Kensington, Gore, S.W. 5 p.m. Lt.-Col. R. C. F. Schomberg, "Climatic Conditions in the Tarim Basin."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 7 p.m. Mr. O. S. Nock, "Modern Methods of Speeding up Railway Traffic."

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture VII—Younger Palæozoic Rocks."

University of London, at King's College, Strand, W.C 5.30 p.m. Prof. D G E. Hall, "A Historical Survey of Anglo-Burmese Relations to 1886."

At King's College, Strand, W.C. 5.30 p.m Prof. R W. Seton-Watson, "Outlines of British Foreign Policy (1815-80) Lecture I—Castlereagh and the Holy Alliance."

At University College, Gower Street, W.C. 4.15 p.m Prof. L. M Brandin, "Lieux communs des chansons de geste."

At University College, Gower Street, W.C. 5 p.m. Prof. A. V. Hill, "Oxygen and the Recovery Process in Muscle and Nerve." (Lecture I).

Victoria Institute, at the Central Hall, Westminster, S.W. 4.30 p.m. Lt.-Colonel L. M. Davies, "Scientific Discoveries and their Bearing on the Biblical Account of the Noachian Deluge."

Tuesday, January 21..Automobile Engineers, Institution of, at the Engineering and Scientific Club, Wolverhampton. 7.30 p.m. Mr. T. W. Cooper, "Roller Bearings."

Electrical Engineers, Institution of, at the Albert Hall, Leeds. 7.30 p.m. Captain P. P. Eckersley, "Broadcasting by Electric Waves." (Faraday Lecture).

At the Engineers' Club, Manchester. 7 p.m. Messrs. B. A. G. Churcher and A. J. King, "The Analysis and Measurement of the Noise emitted by Machinery."

At the College, Loughborough. 6.45 p.m. Mr. L. C. Grant, "The Breaking Performance of High-Power Switchgear and of a New Form of Quenched-Arc Switch."

Heating and Ventilating Engineers, Institution of, at Milton Hall, Manchester. 7 p.m. Mr. Richard Sutcliffe, "Air Conditioning for Cotton Mills."

Illuminating Engineering Society, at the Royal College of Music, Prince Consort Road, South Kensington, S.W. 7 p.m. Mr. C. Harold Ridge, "The Art of Stage Lighting."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. F. W. Aston, "Isotopes."

Statistical Society, at the Royal Society of Arts, Adelphi, W.C. 5.15 p.m. Mr. Barnard Ellinger, "Japanese Competition in the Cotton Trade."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.45 p.m. Informal Meeting. Mr. A. W. Arthurton, "The Railways Act, 1921—Has it been a success?"

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. the Rev. P. Dearmer, "Italian Painting. Lecture II—Duccio (1260-1339) and the Fourteenth Century Sienese. The Renaissance in Florence, Masaccio (1401-28) and the others."

At King's College, Strand, W.C. 5.30 p.m. Dr. C. H. Lobban, "Bridges and Bridge-Construction." (Lecture I).

At King's College, Strand, W.C. 5.30 p.m. Prof. Sir B. Pares, "Russian History from Peter the Great to 1801. Lecture I—Peter the Great."

At University College, Gower Street, W.C. 5 p.m. Prof. S. Radhakrishnan, "An Idealist Philosophy of Life." (Lecture I).

At University College, Gower Street, W.C. 8.15 p.m. Miss E. J. Davis, "How London Became the Capital of England." (Lecture I).

Wednesday, January 22..Autmobile Engineers, Institution of, at the Engineers' Club, Manchester. 7 p.m. Mr. H. K. Whitehorn, "Petrol-Electric Vehicle Characteristics."

Geological Society, Burlington House, W. 5.30 p.m.

Mechanical Engineers, Institution of, at the Merchant Venturers' Technical College, Bristol. 7 p.m. Engineer Vice-Admiral R. W. Skelton, "Progress in Marine Engineering." (Thomas Lowe Gray Lecture).

North East Coast Institution of Engineers and Shipbuilders, at Bolbec Hall, Newcastle-on-Tyne. 7.15 p.m. Mr. R. Harding, "The Psychology of the Shipbuilding Industry."

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture VIII—Mesozoic Rocks."

United Service Institution, Whitehall, S.W. 3 p.m. Group-Captain C. L. Courtney, "The Strategical Mobility of Air Forces."

University of London, at King's College, Strand, W.C. 5.15 p.m. Prof. R. McElroy, "The Social and Political Ideas of Some Representative Thinkers of the Revolutionary Era. Lecture II—Theorists of the American Revolution."

At the London School of Economics, Houghton Street, W.C. 6 p.m. Mr. G. D. Gardner, "Office Machinery. Lecture I—Some Comments on Staff Management II."

At University College, Gower Street, W.C. 3 p.m. Signor C. Pellizzi, "La lirica del Paradiso." (Lecture I).

At University College, Gower Street, W.C. 5 p.m. Prof. S. Radhakrishnan, "An Idealist Philosophy of Life." (Lecture II).

At University College, Gower Street, W.C. 5.30 p.m. Mr. J. H. Helweg, "Northern Mythology." (Lecture I).

Thursday, January 23..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Mr. H. B. Howard, "Certificates of Airworthiness."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Mr. L. C. Grant, "The Breaking Performance of High-Power Switchgear and of a New Form of Quenched-Arc Switch."

Linnean Society, Burlington House, W. 5 p.m.

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds. Mr. E. G. F. Stevenson, "Payment by Results."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. H. A. Harris, "Growth of Children in Health and Diseases."

Rubber Technologists, Institute of, at the Manchester Cafe, Ltd., Exchange Buildings, Manchester. Mr. B. D. Porritt, "Some Aspects of Standardisation."

University of London, at University College, Gower Street, W.C. 5.30 p.m. Prof. C. J. Sisson, "Two London Theatres in Shakespeare's Day: the Red Bull and the Boar's Head." (Lecture II).

Victoria and Albert Museum, South Kensington, S.W. 5.30 p.m. Mr. E. Maclagan, "Italian Sculpture of the Renaissance."

Friday, January 24..Chemical Engineers, Institution of, at the Institution of Civil Engineers, Great George Street, S.W. 6.30 p.m. Dr. Herbert Levinstein "Films and Fibres derived from Cellulose."

Engineering Inspection, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Mr. John H. Clarke, "The Anderson Rotary Piston Engine."

Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Mr. W. J. Rees, "Refractories for Steam Raising Furnaces."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Mr. E. Watson Smyth, "General Operating Experiences with the first Wood's Steam Generator."

North East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-on-Tyne. 6 p.m. Mr. Robert A. MacGregor, "Failure of Steel Forgings and Castings through Fatigue."

Physical Society, at the Imperial College of Science and Technology, South Kensington, S.W. 4.45 p.m. (1) Messrs. J. M. Nuttall and E. J. Williams, "A Method of Examining Stereoscopic Photographs." (2) Mr. S. E. Green, "The Photography of Fabry and Perot Interferometer Fringes by the Use of a Simple Optical System." (3) Miss W. A. Leyshon, Ph.D., "Characteristic of Discharge Tubes under 'Flashing' Conditions, as Determined by the use of a Cathode Ray Oscillograph." (4) A demonstration of a pH apparatus will be given by W. E. Dora[illegible]

Royal Institution, 21 Albemarle Street, W. 9 p.m. Sir William Bragg, "Cellulose in the Light of the X-Rays."

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture IX—Tertiary Rocks."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "Russian Literary Criticism. Lecture II—The Rise of Journalism, and of Philosophical Criticism. (1825-40)."

Saturday, January 25..L.C.C. The Horniman Museum, Forest Hill, S.E. 3.30 p.m. Mr. H. Harcourt, "Things Old and New from India's Treasury."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Dr. R. W. Chambers, "Sir Thomas More and his Friends."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2

NOTICES

NEXT WEEK

MONDAY, JANUARY 27th, at 8 p.m. (Cantor Lecture). HAROLD WRIGHT (of Messrs. P. and D. Colnaghi and Co.), "Three Master Etchers: Rembrandt, Méryon, Whistler." (Lecture II).

The Lecture will be illustrated by lantern slides.

TUESDAY, JANUARY 28th, at 4.30 p.m. (Dominions and Colonies Section). SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., Director, John Innes Horticultural Institution, Chief Scientific Adviser, Ministry of Agriculture, "Settlers' Problems in Kenya." The RIGHT HON. W. G. A. ORMSBY-GORE, P.C., M.P., will preside. Tea will be served in the Library from 4 o'clock.

WEDNESDAY, JANUARY 29th, at 8 p.m. (Ordinary Meeting). SIR THOMAS H. HOLLAND, K.C.S.I., K.C.I.E., D.Sc., LL.D., F.R.S., "The International Movement of Mineral Products during Peace and War." (Trueman Wood Lecture). THE RIGHT HON. VISCOUNT CHELMSFORD, G.C.S.I., G.C.M.G., G.C.I.E., G.B.E., formerly Viceroy of India, will preside.

COUNCIL

A meeting of the Council was held on Monday, January 13th. Present:—Mr. Llewelyn B. Atkinson, M.I.E.E., in the Chair; Sir Charles H. Armstrong; Lord Askwith, K.C.B., K.C., D.C.L.; Mr. Alfred C. Bossom, F.R.I.B.A.; Sir Atul C.

Chatterjee, K.C.I.E.; Captain Sir Arthur Clarke, K.B.E.; Sir William Henry Davison, K.B.E., D.L., M.P.; Mr. Peter MacIntyre Evans, M.A., LL.D.; Sir Edward Gait, K.C.S.I., C.I.E.; Rear-Admiral James de Courcy Hamilton, M.V.O.; Mr. P. Morley Horder, F.S.A.; Major Sir Humphrey Leggett, R.E., D.S.O.; Sir Reginald A. Mant, K.C.I.E., C.S.I.; Sir Henry A. Miers, F.R.S.; Col. The Master of Sempill; Sir George Sutton, Bt.; Mr. James Swinburne, F.R.S.; Mr. Carmichael Thomas; Mr. H. T. Tizard, C.B., F.R.S., and Lt.-Col. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., with Mr. G. K. Menzies (Secretary), and Mr. W. Perry (Assistant-Secretary).

A letter was read from Sir Frank Warner, resigning his seat on the Council on the ground of continued ill health. The Secretary was instructed to convey the sincere regret of the Council to Sir Frank Warner, and their deep appreciation of the services which he had rendered to the Society, especially in connection with the Annual Competition of Industrial Designs.

The Chairman reported that Dr. S. Z. de Ferranti, D.Sc., F.R.S., who had been a Fellow of the Society since 1883, had died suddenly in Switzerland, and it was resolved that the sympathy of the Council be conveyed to the family of Dr. de Ferranti.

The following candidates were duly elected Fellows of the Society:—

Anantani, Biharilal N., Zanzibar, East Africa.
Aslam Khan, Malik Mohammed, M.A., London.
Barrett, Hubert, Dorchester.
Bates, Edward, London.
Bishop, Archibald H., London.
Brünner, Sir Felix J. M., Bt., London
Cahn, Sir Julien, Loughborough, Leicestershire.
Callard, Mrs. J. A., Chesham Bois, Bucks.
Dawson, A. L., Ruislip, Middlesex.
De Casseres, Arthur, London.
Desmond, Shaw, Twickenham, Middlesex.
Evans, Lieut.-Commander Charles E., R.N.V.R., Nailsea, Somerset.
Ferrier, Richard F. E., Hemsby Hall, Norfolk.
ffiske, William H., Gorleston, Suffolk.
Ffoulkes-Jones, Miss Marjorye, Chorlton-cum-Hardy, Manchester.
Hunt, Captain W. E., London.
Johnson, Miss Kendal, London.
Kerr-Lawson, J., London.
Lal, Captain Krishna, Indore, India.
Lawler, Laurence Arthur Charles, London.
McGee, Patrick, J. P., Aberdeen.
Mayson, Alfred James, A.R.C.A., Chester.
Mills, George Tom, Coventry.
Milner, Donald E., A.R.C.A., Gloucester.
Morgan, Hon. Evan Frederic, London.
Mossop, Harold Charles, London.
Muncaster, Claude, Pulborough, Sussex.

Peach, Harry Hardy, Old Knighton, Leicester.
Popham, James Kidwell, Witham, Essex.
Porte, William Church, Belfast.
Poulter, Briant, F.R.I.B.A., London.
Sawyer, Henry Charles, Stone, Staffs.
Schiff, Sydney, London.
Slade, Miss Lœtitia, Midhurst, Sussex.
Thorndike, Miss Sybil, LL.D., London.
Thornton, Major-General Sir Henry Worth, K.B.E., Montreal, Canada.
Timmis, Major R. S., D.S.O., J.P., St. John's, Quebec, Canada.
Treadwell, Major Lionel George Newsom, Coleshill, Birmingham.
Turnbull, Andrew Watson, Richmond, Surrey.
Walker, Augustus, Mortimer, Berks.
Walton, Sydney, C.B.E., London.
Warne, Charles Henry, Newport, Isle of Wight.
Wheeler, William, A.R.C.A., St. Alban's, Herts.
White, Franklin, Shoreham, Kent.
Whitman, H. J., London.

Preliminary consideration was given to the question of the award of the Albert Medal for 1930.

An interim report on the preparations for starting restorative work at West Wycombe was received.

Mr. P. Morley Horder, Chairman of the Fund for the Preservation of Ancient Cottages, was appointed to represent the Society at the Conference on the New English Countryside at Oxford on January 18th.

Mr. E. R. Edis, Chairman of the Pottery and Glass Section of the Annual Competition of Industrial Designs, was nominated to represent the Society on the Organising Committee of the Glass Convention, 1930.

A quantity of formal and financial business was transacted.

HISTORY OF THE ROYAL SOCIETY OF ARTS

Further copies of the History of the Royal Society of Arts by the late Sir Henry Trueman Wood, the existing supply of which was recently exhausted, are now available, and can be obtained, price 15*s*. net, on application to the Secretary. The History, a large octavo volume of 558 pages with a large number of illustrations, gives a well documented account of the many and various activities of the Society from its foundation in 1754 to the year 1880.

CANTOR LECTURES

MONDAY, JANUARY 20th, 1930. DR. E. F. ARMSTRONG, D.Sc., LL.D., Ph.D., F.R.S., in the Chair. MR. HAROLD WRIGHT delivered the first of his course of three lectures entitled " Three Master Etchers : Rembrandt, Méryon, Whistler." The lectures will be published in the *Journal* during the summer recess.

NEWS OF THE WEEK

The soul is dyed the colour of its leisure thoughts. A man's rank in the scale of being is determined by the things he loves and is interested in. What we care about, that we are.

There could hardly be a more dismal confession of moral and intellectual failure than to admit that our leisure hours hang so heavy on our hands that we must needs escape from our own empty-headedness by betting on a football match or a horse race.

W. R. Inge, Evening Standard, April 17th, 1929.

From *The Bedfordshire Times.*

> " It ought to be unnecessary in these days to lay stress on the all-importance of education. Any subject can be referred back to it: and most subjects are. But the difficulty is this, that, if you grant that the present generation of doers is suffering from the effects of a bad education, there is nobody to ensure that the coming generation receives a good one. Take up any book or pamphlet or newspaper that you like, open it at haphazard, and the first paragraph you light on is this—or something like it :—" How was this to be changed ? It could not be changed just by Act of Parliament. Acts of Parliament had proved in the past to be dead failures in a thousand directions. It could not be changed by pious generalisation. It could only be changed by [—what do you suppose ?—] that much disused thing education, by giving the child an idea of the beautiful. That was a very slow way, but it was the only way."
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> That particular paragraph happens to be taken from the report of a speech by a well-known novelist and critic, Mr. Shaw Desmond ; but there are hundreds and thousands of others who would be at no pains to disown it. And the journal from which it is quoted happens to be *The Journal of the Royal Society of Arts* : and the subject under discussion happens to be the disfigurement of town and country by " the vulgar shouting signs which spring up behind hedges and often invade what the public have been led to recognise as a beauty spot." An illustrated article in a recent number of *The Bedfordshire Times* dealt with the same subject : but the point here is the tendency to give up the present generation as hopeless, and yet to imagine that it is capable of educating the next generation in the very principles of which it is so devoid itself. How shall the blind lead the blind ? Or how (in the alternative) shall we persuade our City Fathers to accept the leadership of unspoilt children ? Seriously, can we afford to wait until these children mature—and then, belike, prove no better than ourselves ? For the fault, dear Brutus, is not in our stars—nor in our children's children—but in ourselves, that we are underlings."
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> *Bedfordshire Times.*

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The only comment on this is that the Royal Society of Arts does not think we can afford to wait and remain under the stigma of being indifferent, or as a Nation of being contemptuous of *High-brows.*

Practical Education.—A Fellow of the Royal Society of Arts has offered the Chairman of a Housing Committee in Oxfordshire £25 bonus for each of the ten cottages it is proposed to put up in his district if such cottages are built in the local materials and to the approval of the Preservation Committee of the

Royal Society of Arts. He does this to give a practical demonstration that by direct labour and economy this can be done and with results that will leave the greatest purist for the preservation of the English landscape, satisfied. Further information as to this offer will be forthcoming.

Syon Park.—When will County Councils and Local Authorities realise that slowly public opinion is becoming of some importance? Richard Wilson's picture of Syon Reach from Kew Gardens painted in 1776 exists and this view cannot be destroyed by an ill-considered sewage works. "It is much to be hoped," says the Duke of Northumberland (the noble owner of Syon Park), "that the Middlesex County Council in its wisdom will reject the scheme, but should they proceed with it, I shall oppose it to the utmost in the *confidence* that I shall have a great weight of public opinion behind me." He will certainly have any authority which this historic Society has, to assist him.

Oxford Preservation.—The Chairman of the Preservation Committee attended with Mr. Shaw Desmond, a Fellow of the Society, to represent the Royal Society of Arts at an Oxford Conference on Saturday. No opportunity had been given for the Society to express its views on the programme. Indeed, the invitation came almost too late for arrangements to be made for the attendance of representatives. However, they managed to get there for the second meeting, and Mr. Shaw Desmond wound up the Conference with a speech which the Chairman referred to as eloquent and wise.

> Only education, Mr. Desmond said (or public opinion, which really means the same thing), could prevent ugly advertisements. He spoke of the Danish children, the humblest of whom would regard it as ill-bred to throw down a tram ticket in the street or leave paper in the public park. He instanced similar discipline from half-a-dozen European countries in which he had lived. But education was a matter of at least two generations. If they depended on Acts of Parliament, as some speakers had fatuously suggested, they would be depending on a broken reed. Such Acts would only set free another horde of officials to torment this official-ridden country, with resultant increased taxation.
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> The Royal Society of Arts had no patent panacea like the politicians, who misled the people. They had only two things—Education and Time.
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> The speaker then dealt with the "Americanization" of England and its causes, and advocated pulling down disfiguring advertisements, and chancing the long arm of the law, as he had seen it done in America.
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> He finished by throwing bouquets at himself and the Royal Society of Arts for sending him, winding up with a magnificent flourish of trumpets to the effect that what the Society thinks to-day, Oxford might think to-morrow, and that if the Royal Society of Arts had only West Wycombe to its credit as the microcosm of the macrocosm of what England might one day be again, that alone would have justified its existence.

By the way, a most excellent and informative speech was made by Mr. Hardy Thompson on Housing Materials, in which he stressed the point that, after all, materials played quite as important a part as design. In fact, he packed a great deal of most useful information into a short and interesting speech, which it is hoped will be fully reported.

The Beeches of Goodwood.—The Royal Society of Arts has given many diplomas for the encouragement of the growth of trees in England and views with consternation the wholesale depletion of one of the noblest estates in England. The following is a Press announcement:—

> On February 6th a very remarkable, and probably unprecedented, sale will be conducted by Messrs. Jackson Stops at the Richmond Arms Hotel, Waterbeach, near Chichester. They will then offer by auction more than two million cubic feet of beech now standing on the Duke of Richmond's Goodwood estate. This timber is reputed to be the finest beech in England, and it is not to be supposed that so vast a quantity has ever before been put up for sale. Goodwood is an unusually richly wooded estate, thanks to the improving zeal of the third Duke of Richmond (1750-1806), the great-grandson of Charles II. He bought much additional land, enlarged the park from 200 to 1,200 acres, and, having succeeded to an estate of 1,100 acres, left it measuring 17,000. He was a great planter, and it is almost entirely to him that Goodwood owes its sylvan wealth. The estate bears a great variety of timber in plantations of very varying forms; their sites were selected with the utmost care in relation either to utility or amenity. The park is especially rich in cedars, the Duke having planted in 1760-61 about 1,000 of these beautiful trees, and although only a small proportion of them is now left, they are a superb adornment. Probably most of the beeches that are about to be sold owe their existence indirectly to the planting Duke, as the descendants of those which, like the Laird o' Dumbiedykes, he was " aye puttin' in." Almost simultaneously with the announcement of this great sale it has been made known that the Goodwood library is also shortly to be dispersed. Successive Dukes of Richmond have been so devoted to agriculture that the library is naturally rich in works dealing with the most ancient of all occupations.

This noble Park is a National possession. If this unthinkable destruction is the consequence of financial pressure from Death Duties, is there no way of spreading the demand over a period that would allow the Duke owners to reconsider this decision? The loss of natural beauty on this scale seems irreparable. As Mr. Harold Cox points out, however, this is not a time for urging any addition to national expenditure. In the evidence given by the National Trust (at a Government Committee) they suggested we could secure for all time many of the existing beauties of England, simply by exempting from Death Duties private estates that are already courteously thrown open to the public by their owners. Will the Government help them?

Abbey Sacristy.—We commented on the Abbey Sacristry and its delay in issuing a report of a Committee set up to consider the best way of getting the necessary accommodation for the Church ordinances without confusing the lines of this, the noblest of English Abbeys. The long controversy seems to have been worth while after all, if such accommodation can be found under the octagonal crypt below the Chapter House. The Dean is to be congratulated on his patience and forbearance, and he will be doing a public service if he will now assure all lovers of the Abbey that he, as the Custodian of its fabric, accepts the advice of the Committee he himself set up.

Yet Another Society.—*Punch* has suggested yet another Society, and surely there is some argument for it. The spread of ugliness has created such familiarity that a " Society for the exhibition of Ugliness " would surely have its uses. We congratulate Mr. A. P. Herbert on his versatility. It did seem impossible to invent another, and one so obviously required.

New Fellows.—The large number of applications to join the Royal Society of Arts as Fellows would seem to indicate a renewed interest in their historic work for the Encouragement of Education in regard to the Arts, Science and Commerce of *this* Country.

PROCEEDINGS OF THE SOCIETY

EIGHTH ORDINARY MEETING

WEDNESDAY, JANUARY 15TH, 1930

PROFESSOR H. E. ARMSTRONG, Ph.D., LL.D., D.Sc., F.R.S., in the Chair.

THE CHAIRMAN, in introducing the lecturer, said that he had had a telegram from Dr. Mellor stating that he and Mr. Bernard Moore were detained at Stoke-on-Trent by reason of meetings connected with an inferior subject to the one under discussion that evening, namely, glass ! It would have been extremely interesting to have had the views of these two experts, but in this inco-ordinated world events would conflict with one another. It was not necessary to say that the lecturer of the evening was a practical potter, and he knew that he had an extraordinarily interesting lecture to deliver.

The following Paper was then read :—

QUALITY IN POTTERY

BY JOSEPH BURTON, A.R.C. Sc.I.
(of Pilkington's Tile and Pottery Co., Ltd.)

Quality is a term which denotes super-excellence in one form or another, but when used without qualification to express appreciation of a work of applied art it generally refers to aesthetic quality only. There are certain technical qualities, such as hardness and durability in pottery for example, which in themselves have little or no aesthetic value ; and there are personal and creative elements in artistic quality which take us beyond the realm of the purely aesthetic. Aesthetic quality is inherent in the material just as artistic quality is inherent in the artist. We shall deal in this paper mainly with aesthetic quality but even here the craftsman contributes something personal—some element of selective taste or sympathetic feeling in the treatment and fashioning of his material. It may be of interest to determine the true significance of aesthetic quality—what it implies and how it is derived. Every material used by the craftsman has certain natural properties, and one or more of these may be unique or may be possessed in greater degree by one material than by any other, and so may be characteristic of that particular material. These characteristic properties bear the same relationship to material that individuality does to the craftsman they are the precious and distinctive attributes, and it is their revelation by means of the processes employed by the craftsman that creates quality. The sound craftsman has always recognised this subconsciously without attempting to find a formula or definition to explain the intrinsic value of his work, but such a definition, however tentatively held, may be distinctly helpful as a working hypothesis and may also add something to our knowledge and appreciation of a work of applied art. This definition may be worded as follows—" Aesthetic quality is the revelation of the characteristic properties of material by means of the processes employed by the craftsman." A shapeless lump of wet clay has no aesthetic quality, but it possesses all the characteristic properties of clay, and when these latter are revealed by the potter in the fashioning and baking of his ware, we at once obtain aesthetic quality in the finished pot.

We are dealing in this paper with quality in pottery, so it is necessary to determine the distinctive or characteristic properties of the materials used by the potter and the methods employed to reveal them. The only essential material is clay, for any article fashioned of clay and hardened by fire may be rightly described as pottery. We shall here confine ourselves to what is usually described as earthenware, stoneware and porcelain, and particularly to that section of these which is valued partly at least for its aesthetic qualities. It will be realised at once that here we have to consider other materials in addition to clay, as nearly all pottery of this class has a covering of glaze, and some of it is decorated still further by the application of certain mineral substances used as pigments. Of these materials, glaze is as important as the clay itself, for not only is it essential in glazed pottery, but it is capable of developing a bewildering variety of interesting and beautiful effects. Clay is the name given to a wide range of fine-grained earthy substances which are plastic in the wet state, and which when heated to a sufficiently high temperature sinter together into a permanently hard coherent mass. Clay is one of the insoluble residua of certain felspathic rocks, and as, too, all clays (except china clay) have been carried by water over other geological formations, they are all mixtures of various mineral substances. They all contain, however, a basis of true clay substance which is a hydrated aluminium silicate. There are several silicates of this type which have claylike properties, but the only one we need consider is that represented by the formula $Al_2O_3 .2SiO_2 2H_2O$. China clay or Kaolin corresponds very closely to this in composition although it contains small amounts of other mineral substances, soda, potash, lime, magnesia, oxides of iron and titanium, free silica etc., but all other clays with very few exceptions contain a greater proportion of one or more of these substances and so are less pure than china clay. The clays or bodies commonly used by potters consist (with certain exceptions such as English china body) of mixtures of clay, quartz or flint, and felspar, in suitable proportions. Certain natural clays contain these ingredients in proportions which render them suitable for use without further admixture, but the great bulk of potter's clay is an artificial mixture of the above-named substances in a fine state of sub-division, and the type of ware produced is determined by the selection of these materials, the proportions in which they are mixed, and the temperature-time of the firing process. These clays however obtained or prepared have several distinctive properties. They possess a certain plasticity and cohesion when wet which enables them to be shaped by hand with or without the use of other tools or appliances, and they have a high binding power when dry, so that articles formed from clay retain their general shape whilst drying and even whilst baking in the potter's ovens, although, at the same time, they contract considerably ; and they become permanently hard and more or less stonelike when heated to a sufficiently high temperature. The processes involved in the making of pottery ware fall into two groups. The first of these consists of the manipulative processes such as the preparation of the clay, shaping, modelling, painting etc.—which are completely under the control of the craftsman, and are, indeed, his chief means of direct expression. The other group consists of the firing processes, in which chemical and physical changes are brought about which are only indirectly and incompletely under the control of the potter, and are in fact the manifestation of the interplay of natural forces. The pottery craftsman never works directly in the finished material but only in the raw clay, glaze or colour, which are completely altered in many of their physical properties during the firing, which is always the final process in pottery making.

Wet clay can be fashioned into shape by several methods. It can be shaped or built up by the hand alone, it can be pressed on or into moulds, it can be thrown on the potter's wheel, and when mixed with more water, it can be cast in porous moulds. Of all these methods of shaping, only one is peculiar to clay, that of throwing on the wheel. Other substances can be shaped or built up by hand or pressed or cast in moulds, but no other substance in common use possesses the peculiar plasticity and cohesion that would enable it to be shaped by hand on a slowly revolving horizontal wheel. Even some of the clay mixtures in use to-day cannot be readily thrown and they are pressed or cast in moulds, but potters and connoisseurs generally agree that the thrown form which reveals this distinctive plasticity of clay is the most interesting and most claylike of all pottery forms. Fashioning on the wheel carries with it many advantages. The thrown form has a feeling of organic growth and life which comes through the hands of the potter as he pulls and folds and caresses the spinning mass of clay—it has all the incidental subtleties of the soft plastic material which takes and reveals every touch of the potter's fingers, and its surface has the soft wet clay finish which is unobtainable by the pressing or casting methods. During the drying and firing processes the thrown form not only contracts, but it tends to uncoil or twist backwards in the direction opposite to the pull of the thrower's fingers, and this introduces a further characteristic modification of the form.

All these subtleties of form give a feeling of natural expression—a quality of life - based on the revelation of the natural properties of clay in the hands of the potter. Some of these effects are lost if the thrown shape is afterwards turned down by tool in the leather-hard condition, and some of the most precious qualities of clay form and surface are sacrificed when the turning process is used ; and so the finger-finished thrown shape stands out as the most characteristic and satisfactory of all clay forms. There are also certain limitations which this method imposes on the potter. The thrower's fingers work in conjunction with the revolving wheel, and in practice the thrown line is either an uplifting and outswinging curve when the centrifugal fling of the spinning clay is allowed a considerable degree of free play and the fingers workwith it and keep it within reasonable bounds ; or a rounded and incurving line where the potter's hands exert greater control and fold the clay upwards and inwards, curbing its tendency to spread outwards. These two types of curve can be combined in various ways and one can pass into the other through an almost straight line, but an actual straight line is very difficult to produce by throwing on the wheel, even by the use of a profile tool or template, and it is almost impossible to produce by the hand alone.

Working within the limitations of his material and process the thrower can produce a great variety of beautiful forms all of which have a feeling of growth—a certain spring upwards or spread outwards or curve inwards of a natural rather than a geometrical order. The forms made when the fling of the clay is the dominant factor possess a quality of active growth and movement, whilst the forms produced when the thrower's hands curb this tendency to spread outwards are rounded and incurving, suggesting finished growth and rest. Any modelled or incised ornament can only be applied after the throwing is completed, so that the thrown pot is generally simple and strong in form with sweeping natural curves which have many incidental subtleties arising out of the nature of the material and the method of its fashioning. We have dealt so far with shape in relation to the clay, but in glazed pottery it is necessary to consider shape also in relation to the glaze. The Chinese potters of the Sung Dynasty visualised their pots in the finished glazed state and they selected those shapes which were best adapted to reveal and enhance the qualities of the glaze. The glaze on pottery is a coating of a vitreous material of the nature of glass in composition, but different, from ordinary glass in certain important directions. The. unfired glaze is usually applied in suspension in water and it is vitrified by heat to a more or less glassy state by the partial chemical combination and fusion of the constituent parts. Glazes vary very widely in composition and in behaviour. Many of the glazes used on earthenware, which is fired at a comparatively low temperature, are distinctly glassy in character. These glazes contain either a high percentage of oxide of lead along with the necessary silica and in some cases china stone or felspar, or a high percentage of alkali and lime and generally boracic acid with or without lead oxide. It is usual now to make a lead glass or frit where lead oxide is used in order to reduce the risk of injury to the health of the glaze dipper and placer, and where boracic acid (usually in combination as borax) or excess of alkali are necessary, these materials, which are soluble in water, are fritted together with lime and the essential silica to form an insoluble boro-silicate glass. The glaze mixture is prepared by grinding together definite proportions of these frits and certain potters' raw materials such as china stone or felspar, china clay, flint, whiting, oxide of zinc, etc. These glazes are readily fusible and melt to a very fluid mass which runs down the pot considerably unless applied very thinly. With few exceptions, they have little aesthetic quality in themselves because of their thinness and glassy nature. There are other glazes however, used on some types of earthenware, stoneware and porcelain that are not so fluid at the firing temperature of the ware and are not so glassy in character. These are the glazes having distinctive properties which differentiate them from glass or enamel, and they are capable, therefore, of developing the finest and most beautiful glaze quality. It is obvious that the shape of the pot must determine in some measure the running and gathering of the molten glaze, and this has its influence on the texture and even on the colour of many of the most interesting glazes.

During the firing process many chemical and consequent physical changes are brought about both in body and glaze and between body and glaze. In the body itself at a comparatively low temperature—below 500° C the organic substances which are generally present in greater or less degree are volatilized or burnt out if the firing is properly conducted—from 500° to 700° the clay substance decomposes and the chemically combined water is driven off—from 650° to 1000° any carbonates present are decomposed and carbon-dioxide driven off, and, if the firing conditions are rightly controlled, any carbon present is burnt out—from about 950° to the finishing temperature, which usually varies from about 1,050° to 1,150° for earthenware and from 1,200° to 1,450° for stoneware and porcelain, the various substances in the body begin to form new chemical combinations and to sinter together into a coherent mass, which, if the firing is continued, becomes progressively more vitreous as the temperature increases up to the point where the mass becomes quite vitreous and non-absorbent. If the temperature were continuously increased beyond this point the chemical combinations would be ultimately completed and the mass would become a lump of slag.

The firing of pottery is a temperature-time process in which the unglazed or glazed ware is heated to a certain temperature in and for a certain time, after which the process is stopped. Each type of ware has its own firing conditions, and the degree of accuracy with which the potter controls the rate and temperature of the firing is a very important factor in the successful production of his ware. All the chemical reactions in progress at the end of the firing process are therefore more or less suddenly arrested and the chemistry of pottery is in large measure the chemistry of arrested reactions. The consequent physical changes are also arrested in their stride, and the character and degree of the changes taking place at this point have their influence on the final result. There may be other chemical and physical changes taking place during the first period of the cooling of the ware, particularly in certain types of glaze, and here the rate of cooling in the early stages is an important factor, as this may determine texture and even colour. In these cases too the thin lips and rims and the sharp corners may develop colour and texture effects different from those of the other portions of the pot.

There are several distinctive features of pottery glaze which differentiate it from glass and also from enamel. It is not melted in the mass but always in a comparatively thin layer in direct contact with a pottery body with which it is closely related chemically. There are a series of continuous and progressive reactions taking place between the ingredients of the glaze themselves and between these, separately and collectively, and the body, but all these reactions are arrested at the moment when the firing is stopped and the glazed ware is allowed to cool. In the more fusible and fluid glazes the reactions between the ingredients of the glaze are more nearly completed than in the less fusible glazes, but the reactions between body and glaze become more and more marked as the temperature rises, and are at their point of greatest activity when the highest temperature is reached at the end of the firing process. These latter reactions may influence the texture and quality of the glaze very considerably, and indeed a glaze made entirely from a completely clear and glassy frit may become beautifully opalescent as a result of this reaction. Then there is the flow and drag of the glaze producing inequalities and variations of colour and texture and the quality of a fused but not completely melted matrix suddenly fixed whilst in a state of flux. In certain types of glaze there is an evolution of gas which takes place during and after the fusion of the glaze, and if the latter has a high viscosity and surface tension the small bubbles of gas cannot readily force their way through and so are imprisoned in the glaze. There are many accidental and incidental sources of bubbles in glaze, but in the case just mentioned the bubbles are a constant and characteristic feature, and their presence throughout the glaze brings with it certain qualities of opalescence and a characteristic softness and richness of colour or texture due to the dispersion of light by the bubbles. Many, if not all, of the thicker Sung glazes are of this type, whilst the more glassy, i.e., the more fusible or harder fired glazes of the Ming Dynasty are free from this kind of bubble. It was pointed out by Prof. J. N. Collie some years ago that these Sung glazes contain a notable amount of phosphoric acid, and as they were generally fired in a reducing atmosphere, it is probable that the bubbles are due to decomposition of this compound which was present in the glaze mixture in combination as a mineral phosphate. Many other glazes fired under reducing conditions are full of bubbles, probably due to gases set free by chemical reactions between some of the ingredients of the glaze and the reducing gases. In these cases the bubbles form mainly towards the end of the firing, but another source of liberation of gaseous compounds is the decomposition of one or more of the raw ingredients of the glaze by heat. These materials include china clay and certain mineral carbonates and sulphates, etc. In these latter cases the bubbly effect depends on the temperature of decomposition of the particular substance, the rate of firing of the glaze, and lastly on the viscosity of the glaze in the molten or semi-molten state. Certain glazes develop an opalescent effect which is more obvious in coloured glazes or on coloured bodies or on modelled surfaces. Opalescence, like so many pottery effects, may be due to one of several causes. It may be produced as already mentioned in a completely fritted clear glaze by interaction between body and glaze; or it may be due to the formation of new chemical combinations at the end of the firing process which result in the separation of semi-opaque compounds from the clear glaze matrix. These effects are probably due to incipient devitrification. Opalescence may be due to the presence of certain mineral substances (such as the oxides of tin, titanium, zirconium, etc.) which are almost insoluble in the glaze; or the presence of bubbles as already explained.

Certain substances such as the oxides of titanium, zinc, magnesium, calcium and barium, china clay, etc., when used in excess in glaze mixtures produce a dull or semi-dull texture and surface. Many of these same substances are common ingredients of ordinary clear, bright glazes, but if present in excess they cannot combine completely with the other ingredients or dissolve completely in the melting glaze under the temperature-time conditions of the firing, and so they partly remain in a state of fine subdivision disseminated through the mass. These glazes react more vigorously with body and underglaze colour than the ordinary clear and more neutral glazes, and they are much more susceptible to temperature-time changes. They generally have a smooth shell-like surface which is very pleasant to the touch, and they possess many interesting glaze properties.

Under the temperature-time conditions of the firing process the chemical and physical changes are carried a stage further where the glaze is thin than where the glaze is thick, and so differences of colour or texture may result. A glaze may be opalescent where thin, and clear where thick, or vice versa, according to the cause of the opalescence; or a glaze may be bright where thin, and dull where thick, or the other way round; or it may be more bubbly where thick than in the thinner portions.

All these properties of glazes may be made manifest by the potter, who has the unique opportunity of holding and making permanent transient and elusive effects, and so of obtaining qualities which are specifically and essentially pottery qualities.

Every process may develop qualities of one kind or another, each one of which has its own aesthetic value, but the effects produced during the firing process have all the variety, charm and mystery of nature. Linked up with its aesthetic appreciation the understanding eye can see in these arrested effects something of the nature of the materials and of the changes brought about by fire ; the subtle modifications of form due to contraction ; the reactions and interactions of body, glaze and underglaze colour ; the sluggish flow and gathering of the molten glaze ; the gradual change in some glazes from opacity through translucence towards transparency often accompanied by opalescence, and other more or less obvious effects all of which add their quota to the complex but generally harmonious result.

There is little difficulty in producing a wonderful variety of interesting opalescent and other texture effects in the high-fired raw felspathic glazes, and indeed one of their great attractions to the potter and particularly to the studio potter, is the ease with which beautiful effects can be produced in this medium by anyone working sincerely at his craft.

These glazes are often and rightly fired directly on the clay without any intermediate biscuit fire, and as they are compounded mainly or entirely of raw, i.e., unfritted substances, there is a much wider range of chemical reaction taking place during the firing process, and at the highest temperature of the stoneware kiln these glazes still possess a fairly high viscosity. The firing range of these glazes is much greater than that of the more fusible boracic or lead glazes used for ware glazed at lower temperatures, or in other words, an alteration of a few degrees makes much less difference in a high-fired glaze than in a low-fired glaze. The Chinese potters of the Sung Dynasty were the first to explore and exploit thoroughly these hardfired bodies and glazes, and their productions of nearly a thousand years ago have never been surpassed in those interesting and beautiful qualities which belong essentially to pottery. These Sung stonewares and porcelains are the admiration of potters and connoisseurs alike, and they have set an example of the right treatment of pottery materials and a high standard and tradition in pottery quality which has only been fully realised in Europe during the last thirty years or so.

It is not surprising then that so much attention has been paid to stoneware by the studio and atelier potters of Europe during the last few years, and many very beautiful examples of the potter's art have been produced by them. It is perhaps unfortunate that these craftsmen have devoted so much of their time and skill to the imitation or reproduction of Sung stoneware shapes and glaze effects, and even to the copying of some of the less admirable features, such as the unglazed portion towards the foot, which was left by the Sung potters because of the technical difficulty of supporting a glazed foot during the firing without injury to the finished pot. All the evidence of the sluggish flow of glaze, of interdependence and interaction of body and glaze, and even the symbolic significance of the quiet-toned mother pot of baked earth with its gorgeous covering of coloured glaze, can be conveyed to the sensitive eye by less obvious and elementary means and in a more restrained and more interesting way.

There is another class of materials now to be considered—what are known as underglaze colours. These are mineral compound substances which are carefully prepared so that they may be suitable for their purpose and which are applied to the surface of the clay or fired pot before the application of the glaze.

Potters and pottery chemists have endeavoured so to compound and prepare their underglaze colours and glazes that the chemical interaction between these two materials should be reduced to a minimum, so that the decoration should remain fixed and definite and the colours firm and solid, and apparently almost unaffected except in tint and surface by the covering glaze. It occurred to us some two years ago that to obtain certain characteristic and precious qualities in pottery, we might with advantage work in the opposite direction in the preparation of glazes and underglaze colours. We set out to reveal, as far as our processes would allow, all those properties of body, glaze and pigment which were peculiarly characteristic of these materials, and so to create those qualities which belong essentially to pottery, and which therefore differentiate pottery from all the other forms of applied art. We prepared a range of mineral pigments for use as underglaze colours which would react very considerably with the body and glaze and not only stain into the glaze, but in many cases undergo internal chemical changes during the firing. All these reactions tend to give soft and blurred and broken colour and texture effects which are partly determined by the flow and drag of the glaze (which itself depends to some extent on the shape of the pot) and partly by the nature and point of arrest of the chemical changes taking place during the firing process. These effects are so composite in character, so characteristic of the outstanding attributes of body, glaze, colour and process, that they convey a sense of unity and harmony unobtainable in any other way. The painted underglaze decoration is no longer unrelated —it is part and parcel of the finished pot. At the same time the artist craftsman can add pulsating colour and rythmic design to the other interesting qualities of his glazed pottery and so he finds a wider and deeper outlet for the expression of his own individuality. The artist so designs his decoration that the flow of the glaze and the blurring of the colour do not destroy or unduly distort his work, and so he uses simple broad brushwork patterns which conform to the shape, and are indeed suggested by the shape, and which embellish and enrich the form and give it an added value and quality.

Working with these new underglaze colours and tinted semi-dull bubbly glazes, whose use was based on the application of our definition of quality as a working hypothesis, we noticed other interesting and remarkable properties of one type of glaze, and we immediately tried to devise some satisfactory means of revealing these particular properties. These glazes showed evidence of very high viscosity and surface tension. These properties, and particularly the high surface tension, revealed themselves in the tendency of the glaze in the semi-molten state to contract on itself and curl up from free edges and to assume under certain conditions a semi-spherical form, so giving indications of a self-modelling effect. By the use of certain underglaze pigments we are able to control this modelling, and so for the first time in the history of pottery to produce a self-modelling glaze which can be controlled by the artist. In this way a modelled pattern can be obtained on a plain surface decorated with flat brushwork pigment in a glaze which has been applied quite evenly. The softness and beauty of such modelling is quite exceptional, and the painted pattern becomes in many cases secondary to the self-modelled pattern which is really the background of the painted design, and so again a composite and harmonious effect is obtained which reveals inherent properties of the material. We then experimented with another type of underglaze colour which by chemical reaction makes the glaze covering it more fusible than the surrounding glaze, and here again a self-modelling of a different kind is obtained by the curling up of the more fusible glaze where it meets the less fusible portion.

Pottery is an admirable medium for the production and display of colour of almost every key, from the low toned body colours to the brilliant and vivid hues of underglaze and onglaze pigments and coloured glazes. There is much attention given at the present time to the production of coloured or tinted glazes, and particularly to those which develop a distinct texture which breaks and modifies the colour and adds greatly to its pottery quality. Plain solid colour effects can be produced readily in other materials, but there is a very wide range of texture or naturally broken colour effects which are characteristic of the potter's materials and processes, and these are the effects which potters should develop in every possible way. In variety and richness of colour the earthenware glazes hold first place, but in texture qualities stoneware glazes perhaps come first, although even in this direction the earthenware glazes offer a wide range of interesting effects.

Porcelain occupies a place of its own amongst pottery bodies. It is difficult if not impossible to draw any definite line of demarcation between the types of ware usually described as earthenware, stoneware and porcelain, but there is perhaps one point in this connection worthy of consideration. The difference between earthenware and stoneware is one of degree only and is dependent on the proportionate composition and firing temperature combined, and in fact any ordinary earthenware body can be converted into stoneware by firing it to a higher temperature; but no alterations in firing temperature can convert ordinary earthenware or stoneware into true porcelain. The outstanding quality of porcelain which distinguishes it from other types of pottery is the degree and character of its translucence. Stoneware may be translucent in thin sections, but true porcelain has a brilliant translucence which is evident even in comparatively thick sections, and this is perhaps its most characteristic and valuable quality. Even when very vitreous, the translucence of stoneware is dull or muddy in tone. Porcelain is the only type of pottery in which the body material itself has high aesthetic quality. This is due to its peculiar translucence, which seems to depend on the purity of the materials used in its composition. The determining factor seems to be the clay content, and if the finest porcelain quality is to be obtained, this should consist entirely of china clay or kaolin. Any admixture of the less pure and finer-frained clays seems at once to impair the translucence, making it duller and less pure in tone. There is, however, a whole series of translucent wares which are so closely related to porcelain that it is very difficult to give any definition of the one that excludes the others. This essential purity and refinement of body is a characteristic of porcelain and it imposes in large measure a similar purity and refinement of the glaze. The forms and general treatment of porcelain should be in harmony with these qualities.

The body and glaze of hardpaste porcelain are very closely related in chemical constitution, and when fired at the high temperature of the porcelain kiln they so combine together that there is no definite line of demarcation between them, and the material quality of the glazed ware is a combined body and glaze quality.

Some thirty years ago we tried to find out how and why the Chinese Blue and White of the Kang Hsi period differed from that of any other period or country. In the first place there is the perfect agreement and unity of body and glaze and the beautiful colour of the blue pigment both in itself and in combination with the tint of the glaze. We found that the rich mellow curd-white glaze was full of minute bubbles which probably accounts for some of its beautiful quality, and that the body, glaze and underglaze colour were so compounded and fired that the blue pigment penetrated partly into the translucent body and partly dissolved and floated up into the more transparent glaze. Instead, therefore, of a definite fixed semi-opaque layer of colour remaining as the painter applied it, there is a varying depth of colour, coloured glaze and tinted body which produces a gemlike quality. The pottery painter, struck by the beauty of this pulsating broken colour, floated on his blue pigment in thin and thick washes, and so added his quota to the variety and charm of the colour. The body of the porcelain of this period is mellow in tone, very vitreous and translucent, but not glassy, and one feels justified in stating that Kang Hsi Blue and White is one of the great triumphs of the potter's art.

Wet clay is such an easy material to work and shape, taking so readily and retaining so surely every impression of the hand or tool that it has been universally shaped and carved into models of men and animals and other common objects from the earliest times. In early days all these subjects were modelled in ordinary plastic clay which was afterwards dried and baked into common earthenware, but in more recent times stoneware and porcelain or china figures have been made in ever increasing numbers. In all types of body the peculiar nature of the material used should be taken into account if the finest quality is to be obtained. Many modern Copenhagen porcelain figures have an elegance and refinement of treatment in keeping with their body and glaze, and in marked contrast with the strong and almost crude modelling of Copenhagen stoneware. Fine earthenware body has something of the refinement of porcelain and the strength and plasticity of stoneware, and it too demands the style of design and modelling best suited to develop its particular attributes. It must be pointed out, however, that a great many figures made in porcelain and stoneware are reproduced from moulds which were cast from an original model made in a more plastic clay, but the designer and modeller should always keep in mind the finished glazed figure and carry out his work accordingly. The pottery modeller does not work in the finished material but only in the unfired clay, but the qualities developed during the firing process should have due consideration in the method of treatment, although the imagination, the individuality or artistry of the artist-craftsman has freer scope for expression and plays a more important part in the production of modelled figures than in that of other pottery forms. We are here really in the realm of the fine arts where artistic quality is paramount, just as aesthetic quality is the predominant factor in the applied arts. There are other glaze and colour effects of great interest and beauty that have not been dealt with in this paper for lack of time, and there are also certain purely technical qualities of little or no aesthetic value that have scarcely been mentioned. There are, too, what may be called the purely artistic qualities that have only been touched on, but surely the pottery chemist and the pottery artist should use their knowledge, skill and feeling first of all to develop and if possible to enhance the precious and distinctive qualities of pottery, and their contribution to the finished work should never impair these qualities or detract from them in the slightest degree. Neither chemist nor artist-craftsman should be concerned with the display of mere skill or dexterity in the handling of their materials. The pottery artist may, however, by the exercise of his creative faculties add something of personal expression and feeling in the design of shape or of modelled or painted decoration or in colour treatment, and so give a greater charm and intrinsic value to the finished work. When the artistic and aesthetic qualities are harmoniously blended together we obtain perhaps the highest degree of interest and beauty which it is possible to achieve in pottery.

DISCUSSION

THE CHAIRMAN said that few lectures had been given in that room which were so full of interesting matter. He himself fell in love with the pottery shown by the lecturer about a year ago. This was not when he saw it first, but when he felt it first, and he would ask those present when, after the meeting, they came forward to inspect the examples of pottery which the lecturer had brought, to take care to feel them, because the "feel" of the surface was altogether remarkable. To himself it had the qualities of congealed clay. To love it one did not need to see it. The lecturer had brought forward that evening properties in glazes which he thought were altogether novel to the craftsman. He would call first upon a speaker who knew more than almost any man about form and colour in pottery, and about the conditions under which such workers as the lecturer carried out their beautiful art—Sir Henry Miers.

SIR HENRY MIERS, F.R.S., said that he must disclaim all knowledge of the subject and all practical experience, but he had been enormously impressed by what the lecturer had told the Society. It had been most interesting to be taken by the craftsman behind the scenes, and to be shown the sources of his inspiration. Henceforth he would visit any collection of pottery with new eyes, because he had now been led to understand the feelings which animated the potter. The Chairman had introduced the speaker as one who had practical experience and knowledge of the materials, but while he did know something about the mineral constitution of the materials, that was a very different matter from the theme of the lecture, which was not so much the knowledge of the materials as the potter's intimate use of them. He thought it would be much more to the advantage of the audience if the lecturer would informally continue his lecture, and describe further the examples he had brought, than for himself or other speakers to take up the time available in discussing the subject. He had never been more interested or more impressed by the stimulating effect of a lecture than he had been that evening, and he cordially proposed a vote of thanks.

DR. EYRE said that those present had listened to a lecture which had been altogether inspiring. The lecturer combined the craftsman with the artist, and he had also a keen sense of observation which was looked upon as a characteristic of the scientist. He doubted wehther anything could be added by members of the audience towards unravelling the mysteries of what happened in the making of this pottery. They ought to feel content to benefit by the charming productions which the lecturer was bringing forward, and in that way assist the whole pottery industry of this country. In the past the industry suffered a great deal from the fact that certain people produced pots and then other people decorated them. In this case the craftsman decorated as he made, and schemed out his plan and arrived at an effect which, as he very properly said, was full of aesthetic charm. It was quality for which they were looking at the present time. Industries had suffered in the past from being oblivious of the fact that quality played a very important part in production. Large sums had been spent in educating all and sundry to appreciate artistic things ; he did not think the return had been commensurate with the effort, but men like the lecturer, who could produce things which people in general could gaze at and enjoy, were doing f - more to cultivate good taste than numbers of Evening Schools and Polytechnics. The Society was very much indebted to the lecturer for dealing with a subject of this range in such an encouraging way.

MR. A. L. HETHERINGTON associated himself with all that the two previous speakers had said. He himself could speak only as a student of Chinese pottery and porcelain, but he had studied that subject on the artistic side, the side of the potter, and the chemistry side. It had been very interesting to him in studying Chinese work to observe the methods which the Chinese had employed and the extraordinary skill to which they had reached. If he might make a slight correction in what the lecturer had said about Chinese pottery, he would point out that, although reference had been made to the work of the Sung Dynasty (960—1126), the previous T'ang Dynasty (618—906) also produced perfect classical pottery. The pottery two or three hundred years before the Sung Dynasty might be described as the flower of Chinese pottery. Thus the art in China was very ancient. But what was far more interesting was to see the potter of to-day, of whom the present lecturer was such a distinguished example, producing something of the effects which had been admired so much in the work of the Chinese. He had been specially interested to hear the clear description of the surface tension effect on these glazes, and how these effects had been used by the lecturer and his colleagues to bring about the artistic results which he had exhibited.

He had made a passing reference to the wonderful glazes of the Kang-hsi period. It was very wonderful how these workers stopped the glaze in a controlled way at the foot rim of the vase. Later on, the glaze nearly always overran the foot rim, which had to be ground back, but in the Kang-hsi work it was always perfectly finished at the foot rim. This was a surface tension effect, as had long been suspected, but the effect had been lost and only lately re-dicsovered. There was much more he could say, but he was sure the audience were anxious to have a nearer look, and also " feel," of some of this work.

Mr. Cyril Edwards said that he had listened with great interest to the lecturer, and he desired to add his token of appreciation. The lecturer had not only a great knowledge of pottery, but he was himself a distinguished artist and looked at things from the artist's point of view. One could only wish that all people took the same point of view, but it was regrettable to consider the amount of pottery turned out which was absolutely devoid of quality as regards form, body, colour, and shape. One had to admit that the man in the street failed to appreciate quality in pottery as he should. Plenty of good material was produced,but one wsa bound to say that this was in the minority. Excellent examples of ancient art were available, both the Grecian pottery and the Chinese models also, and with modern advantages in science over the old potters, a far higher level of artistic achievement should be possible than was shown in the general run of the work of the present time. But the point was that the potters could only be stimulated to do their best by appreciation from the great mass of the people.

Mr. H. C. Mossop said that the lecturer had coupled together the pottery artist and the pottery chemist. If he could really bring them together in some sort of harmony in the works themselves he would be doing a great deal for the improvement of English pottery. The speaker had had some experience of both the pottery artist and the pottery chemist, but he discovered that the master-potter wanted to have nothing to do with the artist-potter, and the artist-potter nothing to do with the master. That condition of affairs, he believed, did not prevail on the Continent at all, where, so far as he could make out, the two worked in perfect harmony. They ought to work together, and if they did not, quality must deteriorate.

Mr. Joseph Burton, in replying on the discussion, said that he very greatly appreciated the way in which his audience had listened to the lecture. It had evidently touched something intimate, and had been rather suggestive. That, indeed, was the whole idea underlying the lecture. He had wanted it to be suggestive, and even provocative of thought.

He quite agreed with what had been said by Mr. Hetherington, than whom there was no greater authority on Chinese pottery. The T'ang people were probably the greatest artists as a people that the world had ever known. The period of the T'ang Dynasty was the period of fine flowering of Chinese art. It was as a result of the T'ang feeling of artistry that the succeeding Sung period was able to introduce applied art to such effect. It might be said that the flower belonged to the T'ang period, and the Sung period represented the fruit. Up to the present, few complete examples of the T'ang pottery had been found, but he always felt that the T'ang people were such great potters because they so thoroughly understood their material. They visualised it in the finished glazed form, and everything contributed to produce harmony and unity of effect, things, of course, tremendously important in all applied art. They produced such a wonderful variety of beautiful things, and, after all, it was the production of beautiful things that mattered.

With regard to what had been said about the chemist and the artist, he must say one word about the possibility of a single man carrying out all that was implied in this art. In the Sung Dynasty the bulk of the work was team work. The Sung potters engaged in the mass production of beautiful things. That was what was wanted to-day—a mass production of beautiful things which were not too expensive, within the reach of ordinary people, and cheap enough to use for the common purposes of the house.

The whole question of pottery, to his mind, resolved itself into the revelation of the characteristic properties which belonged to the pottery material. It was these which differentiated pottery from other mediums. Pottery, as he had tried to show in his lecture, was characterised by an infinite variety of effects, because of the extraordinarily complex nature of the materials and processes. There were three or four materials and the fire, and the fire was of various degrees, and some particular glazes were very subject to variation at slight differences of temperature. With a particular glaze, a difference of 10 degrees in the fire would cause the mere force of gravity to overcome the surface tension and the glaze would come down. Surface tension did play its part in the pottery of the Sung Dynasty, and in many of these modern examples which he was able to exhibit the same thing could be illustrated. In some cases the soft glaze came down and had to be ground off at the bottom, but in others the glaze was stopped in a controlled way at the very rim. He added that he would be very glad to give any further account of the examples of pottery which he had brought to the meeting.

THE CHAIRMAN said that he would reserve any considered comments for the *Journal*, but he would like to take up one remark made by Mr. Burton at the beginning of his lecture, namely, that a shapeless lump of wet clay had no aesthetic quality, but that it possessed all the characteristic properties of clay, and when these latter were revealed by the potter in the fashioning and baking of his ware, aesthetic quality in the finished pot was at once obtained. He would very much have liked to preach a sermon to those assembled on the aesthetic qualities of clay. But what he desired specially to do at the moment was to call attention to the way in which the aesthetic point of view would vary. To his mind these wares which were exhibited told an extraordinary story. He showed two pots which he obtained some years ago from Mr. Bernard Moore. They were alike in shape, design, and in all treatment up to the point of firing, but they were quite different in appearance. One was "all smoke" no very clear design, while the other had beautiful red tints as well as green. One of them had been fired in a reducing flame so as not to reduce the copper to a metallic state, while the other had been fired in a different way, and this accounted for the extraordinary differences of tint. He exhibited other examples showing what beautiful effects could be produced by the use of the copper. Another example was a piece of orange-ware which had crystallised out in the glaze ; this was due to lead uranate, and if the vase were placed on a photographic plate an image would be produced on the plate on development, owing to the radio-activity of the piece. That carried with it the story of the modern discovery of some of these crystalline effects which were very marvellous. Yet another example showed, not only a mica cobalt blue structure, but a wonderful structure, he believed, of zinc silicate Some, at least, could find a vast variety of interest in this work, and they felt all the more grateful to Mr. Burton for what he had done to stimulate an interest in this form of pottery. In closing the meeting he wanted to assure him of the hearty thanks of those present, and to wish his industry all prosperity.

The vote of thanks to the lecturer was carried unanimously.

MR. BURTON, after acknowledging the compliment, said that he wondered whether they all realised what thanks were due to Professor Armstrong for the encouragement he had given to industry throughout the country over so many years. He had been a very good friend to the potter. With regard to his remark about the uranium orange, the first piece of this pottery to be made in the world was made in this country in 1904. About four years ago he was in Czecho-Slovakia, where a potter handed him a piece of orange glaze which he claimed to be something new. The potter was surprised to be told that similar glaze had been made in England in 1904, for in

Czecho-Slovakia it had not been possible to make it until after the War. He again expressed the indebtedness of his own, as well as other industries on their chemical side, to Professor Armstrong for the help and encouragement extended over a long series of years.

The following addendum to his remarks has been received from Professor Armstrong :—

The question has often been asked :—" What's Hecuba to him or he to Hecuba ? " What am I to pottery or pottery to me, more than to any other man of clay ? Shall I say simply—I've been known to 'eave 'arf a brick ! Before I went to sea, not in a sieve, still less in a beautiful pea-green boat, but in a ship, I took train to Stoke-on-Trent, to stay with a beloved Aunt and learn the virtues of *Parian* ware : my uncle was at Copeland's. Hence my early interest in clay. I have known the pot-bank since my youth and in my later years have even publicly advised the burning down of the chief of the Five Towns, so that it might be re-created—I suggested upon a Byzantine model—and some feeling of art enter into its soul. How art is ever to flourish in an environment so mercilessly rigid as Staffordshire blue brick I cannot conceive. The present Italian feast of colour in London is some evidence of the consequences the following of such an example might have.

With all our boasted science, a region which has feet of clay still has no conception of the wondrous nature of its support. Its chief biographer can see this no otherwise than as a mere mud : evidently, having made no study of " *Ethics of the Dust.*" Rubies may be rare—still more rare is appreciation of their wondrous nature by those who wear them. Men of words seem to have no appreciation of the beauty of things apparently inanimate ; some day, surely, when science gives wings to the pen, some one will paint the Pottery Towns in terms of Emerald and Topaz, Ruby and Sapphire, not in mere words. If Ruskin could do so much with so little knowledge, with only the gorgeous vision of Old Testament decoration before him, what picture might not his scientifically trained successor draw of the marvels of pottery ware ? A Keats has already led the way. Thus far, I believe, no special attempt has been made even to bring the pre-Egyptian Shard and its story—the marvels of history irrevocably baked upon clay—to the notice of the rising generation in the pottery towns. Josiah Wedgwood is to be beatified this year—a beginning may well be made on that occasion.

Mr. Burton has told us of new conquests. His title might well have been—nay, should have been, *Quality in Clay* (Glazes included) rather than *Quality in Pottery*—too often but the misshapen image of clay. He is provocative from the beginning. Quality in itself is an indefinable word. When he qualifies it by *aesthetic*, he carries us into an entirely mysterious and mystic region—the realm of the soul. ' O my æsthetic soul : my Uncle, where is it ? ' the Uesanian may ask. Sufficient unto himself must be every aesthete. Like pottery glaze and colour, his depth and quality of feeling may be of any degree of tenuity—delicate as a cobweb or harsh and hard as a flint. Art begins not in the object but in the mind of the observer—a sufficiently cobwebby origin.

> " Had I green jars of malachite, this way
> I'd range them : where those sea-shells glisten above,
> Cressets should hang, by right : this way, we set
> The purple carpets, as those mats are laid,
> Woven of mere ferns and rush and blossoming flag."
>
> *Paracelsus.*

The higher and the lower points of view are beautifully set out by the poet in these lines.

Is it right that a potter should seek to give definitions ? The æsthetes may answer : No ! We ask of him only artistic effect : the expression in form, through his finger tips, of his soul—if he have one. A very limited outlook this. Years ago, when the phrase *Soul of a Nation* was first coined, there was a feeling abroad that our language had been greatly enriched. To-night the endeavour is made to picture the *Soul in Clay Glaze*. We have been shown it rising up in mutiny against the clay support, to form a self-modelled surface. Pottery is the artistic embodiment of the Soul in Clay. True it is, we cannot define soul—the word is the most elusive in our language, one into which each one of us may put his own meaning—knowing that, in the end, it can be nothing concrete. Still, the chief beauty of words lies in this vagueness and their power to still our conscience of ignorance.

Mr. Burton unduly limits the application of the term " Aesthetic Quality." " A shapeless mass of clay "—no æsthetic quality ? " The characteristic properties only revealed by the potter ?" This is to judge it by the standard of the potter alone. The potter has not thought of the skeleton in its cupboard of the metal upon which it is modelled, one of the most wonderful we know. How noble a quatrain might not the poet have composed to reckon this newly revealed one in with the old " Clay population ? " Were its voice heard in the Omarian chorus it would triumph over all others as the metal of the future.

I venture to think that Clay is one of the most worshipful of materials—yet it is the most neglected. The " muddied oaf " knows it only in so far that it spoils his " Whites." The football player slides upon its slippery surface, times without number, without giving it heed. Man has made it his chief building stone throughout the ages—without doing more than use it. As soil, it carries within itself the essence of the food supply of all living things—not of man alone. Our Globe essentially consists of but three materials : Sand, Limestone and Clay. The earliest history of man is written in terms of the first—in flint—but broken shards tell us the story of pre-Egyptian civilisation in definite language. Man walks ever with feet of clay upon clay : yet so great is the scientific advance in education that clay is unheeded by the schools ! Can you wonder, that knowing this, speaking to several hundred Science Masters, a few days ago, I urged them to "Hang a few Head Masters," by way of example and warning, to force these to mend their ways and teach something worth knowing ? The grand old fortifying classical curriculum is so fortifying that the lessons at its door pass unconveyed : Virgil was far more observant of clay than any modern writer has been.

" Clay no æsthetic quality ! " To me it is one of the most wondrous substances going. The quality always associated with it, to which its value as a potter's material is due, is *plasticity !* The potter is at infinite pains to make punishment fit the crime—in preparing his clay of a very special degree of plasticity. *Plasticity of What ?* I can only think of it as the *Plasticity of Water*. In clay we have a material consisting of very minute solid particles sheathed with the thinnest of films of water molecules—cellular congeries of soap bubbles in which silicate takes the place of stearate. The force required to distend or disrupt clay is the force required to distort or disrupt the clay-water layers—the " sticktion," to coin a word, of the water film, something very different from that of water in mass. The affinity of water to silicate has also to be considered : some slight and special degree of alkalinity appears to play a part, together with particulate dimensions, in determining the plasticity. Clay is never simply aluminium silicate.

When the water is withdrawn from clay, it is no longer worthy to be called clay—the life blood is gone : it becomes a mere silicate. Burnt clay is a dead material. Transmuted into pottery, it carries the added charms of form and colour : these live upon the clay-body to give it soul. The æsthetic quality in clay will be assessed very differently, by different eyes, according to their penetrative power. Most aesthetes must see very superficially, they can have but little real sense of understanding, whatever whimsy they may fancy. The chemist alone can see within the Holy of Holies which is Colour. Mr. Burton's work introduces a further complication. A variety of colours is often derived from a single treatment—owing to variations in the interactions at different parts of the surface : most pots should carry a full birth certificate to make their interpretation possible.

Dull as it may seem, we are beginning to make clay live and even sparkle as the diamond, in the mind's eye. In silicon—the root element of clay and of the primitive rocks, the element which plays the part in the mineral world which carbon plays in the organic, the two serving to bind together all the other elements in Nature—the atoms are arranged as in the diamond, but with centres more distant apart. We picture both as tetrahedra, differing only in size, though very different, presumably, in inward intratomic turmoil—of whatever order that may be. Silicon is a strangely neglected material—chemists seem to have no eye for the obvious, but only one for the easy. In Carborundum, in which it lives in co-partnership with carbon, silicon plays a great industrial part.

The only characters in history who seem to have taken any real interest in silicon chemistry are the *Walrus* and the *Carpenter*. You will remember how they " wept to see such quantities of sand." Rock crystal or quartz, silica, almost equals the diamond in brilliance and hardness, and is, therefore, sometimes honoured with notice by the fair sex. We know it variously coloured by iron, as sand. Quartz probably affords the most perfect illustration, how misleading appearances may be, that can be found. Brilliant, hard, one of the most infusible among solids, practically insoluble, a molecule which apparently has no desire to move, it is the counterfeit chemical analogue of the common gas from which boys and girls alike and all living things are made—carbon dioxide, which women know probably only as the fizz-gas of champagne and other effervescent drinks. For some reason best known to itself, but to no earthly mortal, the carbon atom in this gas seems to hug its two oxygen atoms so closely that they have neither eyes nor hands for outside admirers. Silicon seems to be but a poor lover of oxygen, and so the fiery atoms of this gas, though firmly clasped in the embrace of a silicon partner, flirtatiously stretch out their hands to others similarly situated. In carbon dioxide ballrooms, the couples (really triplets) dance normally and steadily throughout the evening. In a silica assembly, all sit stock still, as it were, petrified in one solid embrace. So it comes, that sand is hard and forbidding, though socially attractive when near to the sea and warmed by the sun. X-ray analysts have given us imperfect pictures of the internal structure of the forms of silica, which at present lack substance, as they deal only with positions of atomic centres and are too vague to meet the demands of the chemist. Apparently, as the crystalline form is changed, with rise of temperature, some re-distribution of the oxygen affinities takes place, for which, at present, the physicists have no eye.

Passing to colour. Ruskin has told us, in impassioned terms, of the beauty of colour in nature wrought by iron in clay and sand. In days gone by the Chemist had some fellow feeling with the Potter, when much qualitative analysis was obligatory and he was a practised user of the borax bead. Some of the colour in pottery is boracic in its origin. Maybe it is dangerous to say so—a grandmotherly State Department may view the use of this all-terrible poison with such fear as to interdict its use. Perhaps, the existence of this fear has put an end to blowpipe analysis—some explanation is needed of the disappearance of so valuable a discipline. Looking at pottery with a borax-bead eye, the variations in colour are very interesting. Those who regard pots just as pots have little idea how much more they may be to some of us. I show here two pots I secured from Mr. Bernard Moore years ago—which attracted me not as pots but as evidence of his heuristic mind and proof that he fired with brains. They are alike in form; they bear the same design; before firing, they were in all ways alike; now they are very different. In the one, gold fish are swimming, without colour, against a grey and yellow nebulous smoky background; the fish, on the other, have copper blue bellies and they float upon a copper-red background. The one was fired in a reducing atmosphere, the other not; how the blue belly was retained and yet red copper developed close to it without any reduction of lead from the glaze, I do not know: but herein lies the artistry. Here is another, showing fiah swimming in a sea of red coral. On the front of the jar, fish and coral stand out a clear red, as if near the surface; at the back of the pot all is darkness, as if in the depths: here the lead has been heavily reduced and forms a blue-black screen. One is reminded of the great Soyer chewing a little garlic and then breathing into the fire. The ceramic wizard is to be thought of as puffing reducing smoke at only one side of his pot. Firing pottery doesn't mean just placing it in an oven and letting the fire rip: it should be both a science and an art. One more illustration. Mr. Burton recently picked up this pot and put it before me—I almost as promptly picked it up and put it upon the floor. That was my act of worship! Already, I had assembled several pieces there to take away. Opinions will differ as to its beauty: much depends upon the conditions of light and environment under which it is seen; more upon the preparedness of the eye to see. I at once saw that it showed every shade of reduced copper-red, from *peach* to *sang de bœuf*—then, here and there, chiefly in hollows, were delicate touches of unreduced copper silicate, the familiar borax-bead copper-blue colour. Here you have a third copper variant: this tile is pure black—the black of copper oxide. Who shall say that the colour characteristic of copper is blue? Not only may it be the bearer of colour from opposite ends of the spectrum, but of all colours when it is black. Colour has its origin in molecular structure and this varies from compound to compound.

One last point to bring the geologist and petrographer again upon the scene. Geology contributes its material to the potter: the return the potter makes is to show how minerals may have been made in nature. To-day several crystal species are made use of by the potter. On the occasion of a visit to the factory at Sèvres, years ago, I bought this pot hot from the kiln, falling in love with it at sight, on account of the wonderful purity and intensity of its cobalt blue colour and the beauty of the stellate crystal patches of zinc silicate with which it is decorated. This small pot was given to me years ago by Dr. William Burton, the man to whom the pottery industry, in this country, is indebted before all others for the service he rendered in introducing the elements of scientific method. It was one of the earliest specimens showing the formation of an iron mica in the glaze, a form of natural decoration introduced by the Pilkington firm. This is no artefact, but the real thing. The mica crystallises out within a very narrow range of temperature and from this we may infer not a little as to the conditions under which mica is formed in Nature.

I should like to speak of pottery in the school. I long sought to make it popular at Christ's Hospital, and at last made a beginning, but only with the powerful stimulus of *Chu, Chin, Chow*—by taking the Art Master to witness the potter squatting at the corner of the stage, throwing pots—one of the most charming touches in the performance. Now the wheel revolves regularly in the Art School. Nay more, the pots are glazed and fired. I am sure interests are created and most valuable foundations laid in this way. Perhaps, some day, the chemistry school may deign to notice it.

Pots may come and pots may go—under the housemaid's rule. Still, history shows that they may live on to carry imperishable witness from the past and so into the distant future. The records we have of the bison in Europe in clay are estimated to be twenty thousand years old! We are doing too little to write such history. Properly made, they are subject to less decay than that the rocks undergo naturally. No chemist should be without pots, and those who have pots may learn much chemistry from them, if they will.

Looking only on the shape of a Grecian urn, the poet could see in it "a thing of beauty and a joy for ever," creating a phrase of undying charm. Mr. Burton has yet to find his poet. Meanwhile, he has raised the Lancastrian urn to the level of the physicist—to-day a most superior person. He would have us think of the pot in the fiery furnace, the molten glaze patterning itself upon its rigid body, behaving as if it were quicksilver or oil drops floating upon water—its outlines softened and rounded, pulling itself together into clear relief, by its own inward desire, to give to the finished ware an apparently modelled outer form. He calls this a surface-tension effect: really it is an expression of the artistry intrinsic in the materials, call it chemical affinity though we may. The use of such means is a discovery and a new achievement in the potter's art.

If Shakespeare could picture

> " Imperial Caesar, dead and turned to clay,"

we, to-day, may well reverse the simile and show real appreciation of the present imperial value of the material in all its forms. We, too, much neglect it in agriculture. It is surprising that Tennyson ever wrote—

> " He shall not blind his soul with clay."

With so large a Clay population upon this table, we may well remember what one of them said in olden time—

> " My clay with long oblivion is gone dry:
> But fill me with the old familiar juice,
> Methinks I might recover by and by."

What may not happen, if we put the Wine of Wisdom into our modern Cup of Clay? Mr. Burton shows us some of the results.

SEVENTH ORDINARY MEETING

WEDNESDAY, JANUARY 8TH, 1930

MR. P. MORLEY HORDER, F.S.A., a Vice-President of the Society, in the Chair

At the close of Mr. Shaw Desmond's address on " The Novel—What it is and what it is not," which was printed in the *Journal* of January 17th, in response to the invitation of the Chairman a number of questions were addressed to the lecturer by members of the audience. The questions are printed in italics, and the answers in roman type below:—

1. *Is Forster's " The Passage to India " a true account of Indian life?*

I have read recently two books on India, one called *Mother India*, and the other the book just mentioned. I think *The Passage to India* is probably a perfectly true picture of India on a very limited scale. With regard to *Mother India*, it has so astonished and frightened me that I would rather not say what I really think about it.

2. *Does not the ordinary French novel touch a degree of reality conspicuously absent from 90 per cent. of English novels?*

The French mind is a curious mind, and almost *terra incognita* to the great mass of Europeans. The Frenchman is the most intensely insular of Europeans, and he has only one point of view, namely, the French. Within those limits, I am inclined to agree that reality is touched on the raw by the French scalpel, which is the French pen. Zola's extraordinary series I regard as amongst the greater novels of our day. The reason the French are so realistic is because they are always "looking on." They are always neutral. They have no sentiment of any kind. They are emotional. The Englishman, on the contrary, is all heart; he is sentimental. He is always being led astray by this great throbbing organ. That is not to say he is emotional. The difference between emotion and sentiment is the difference between diamond and glass.

3. *Is the failure of the attempt to produce a photographic novel due to the fact that life is something that never stays still, so that the photograph is simply a series of positions?*

That is perfectly true. I have never heard it put so well before. I shall be using that in my next lecture and telling my audience it is my own. The reason the photograph fails is because the camera is the greatest liar in the world. The only people whom it is possible successfully to photograph with the camera are the static people, like actors and actresses who can hold their features. You cannot photograph the "living" man or woman, who is many different things at the same instant. It would require a composite picture made up of a thousand *nuances*.

4. *Is not there an example of the scholar artist in Leonardo da Vinci?*

If a man is to be a really great artist, he will not have the time or the vitality to collect thousands and thousands of facts, which is the business of the scholar. I have always said about scholars that their business is to act as milch cows to us artists. They should bring to us the accumulated results of years of close research. They should lay before us the facts, and allow us to interpret them. Leonardo da Vinci was the exception to all rules. Like Goethe, who incidentally was a great engineer and the originator of our modern roads with their " watershed " surface, Leonardo da Vinci had a " various " mind. He patented—if that word may be used—a flying machine. He was the greatest painter of his time, also a great writer. He touched the spring of cosmic consciousness. Therefore, he does not come into my category, although he was a scholar and although I said the scholar is a mere collector of facts and University degrees. But even so, he never allowed the facts to dominate him as does the scholar and all the time he interpreted his own facts.

5. *How far does the modern novel owe its inspiration to occult forces, and in particular, how far may some of the modern novels be taken as expressing something occult, especially those things which were once regarded as myths?*

Nearly all myths have scientific foundation. In fact, the things that the scientist, especially the physicist, laughed at in the Sixties and Seventies of the last century—remember Tyndall's address to the British Association at Belfast—the modern scientist, especially the mathematician, has proved to be fundamentally true. I did not deal with what I may call " occult inspiration " in my lecture, but I am prepared to say that all great novelists—the same is true of all great fiddlers—are played upon by thousands of occult forces of which we are just becoming dimly percipient, and the thing that makes some women and men writers unconquerable, not only personally, but in their writings, is because they feel that behind them there are forces that cannot be turned.

6. ***Would the lecturer permit a question rather aside from the main subject? I have met Gandhi, and was very much astonished to find what an insignificant individual he was according to my ideas, although at the same time he had great influence with his own people.***

How is it that this man has got this tremendous influence, which apparently he has, and which may very well lead to a tremendous eruption in India?

As regards Gandhi, who originally was a solicitor, and who went to Africa, and afterwards back to India, he is not an orthodox Hindu, but he more or less keeps in touch with the 200 millions of Hindus in that continent of 315 million people, and he has managed to secure greater power than any other individual in India. I regard him, not as an artist, but as a kind of focus for forces that lie behind life and which use him for their expression.

7. *Mr. Desmond has mentioned the sex obsession prevalent amongst a great many novelists, and definitely stated that it was this aspect of their books which induced people to read them. How does he account for the remarkable success of such works as the scientific or pseudo-scientific works of Wells, which are almost entirely lacking in sex interest? Secondly, as to the future of the novel, does he anticipate perhaps that when the phase of sexual unrest through which we are passing has been succeeded by something more stable, we may possibly get a new plane of art altogether, and something may be produced of which we have at present no conception?*

As for Wells's scientific books, their popularity is largely accounted for by the fact that when they appeared they opened up a new field. Nobody had ever written that kind of thing since Jules Verne, and he had done it in quite a different way. Moreover, Wells's books synchronised with a new interest in all scientific matters and especially in those of social science. If published to-day they would not meet with anything like the same success.

As to the second question, I myself believe absolutely in spiritual chastity. That is more than physical chastity, though I believe in that also, and in a very definite sense. I believe in what I may call "containment," if anybody is to do any great consistent work in the world of art. The questioner has suggested that the English mind is now turning away from this excessive concentration on sex. I believe that when once the English give up their erotic concentration, due to "suppression," for which they are famous throughout the continent, they will be likely to develop a new type of art.

8. *Mr. Desmond said in his lecture, in speaking of the English, that he would not include the Welsh. What differences does he find in the Welsh?*

I have lived in Wales, both north and south. I recall one village with three or four hundred people and with fourteen sects. The Welsh people are all of them poets, also they are excellent light and middle-weight boxers. I have never met a people through whom there was distributed so evenly the divine faculty of poesy. The number of poets in any land is, of course, far greater than we suppose. All the great prose novelists write poetry; not in appearance, but if one studies it, there is rhythm behind it. Another thing the Welsh have done is that they have conquered something which no Englishman has ever yet attempted, and that is the Welsh language! Finally, one of the greatest differences between the Welsh and the English is this, that the Welsh are an indirect people—only an Irishman could put it like that!—you never know where you have your Welsh friend, but he generally knows where he has you!

9. *May I ask where you would place Sir Walter Scott, whose novels have still wonderful popularity, but who is never erotic? And what does the lecturer think of Robert Burns?*

It takes a Scotsman to put an Irishman into the corner and it takes an Irishman to get out of it! I have just come back from Glasgow and Edinburgh. There was a time when I used to hate Scotsmen. We could never get on together. If ever I got into a room where there were two or three Scotsmen—I do not say Scotswomen—I always got on the wrong side of them. Since my last visit to Scotland, however, I have come to believe very much in the Scottish people, and in their real decency - using that word in its very best sense—also in their capacity to think things through. As for Sir Walter Scott, I deny that he was a Scotsman. It is true that he was born in Scotland, but he had not got the Scottish soul—he was a Lowland-Englander. The real Scottish soul is found in the Western Highlands. Sir Walter Scott is rather a respectable person, and I hate respectable people. All his books I enjoyed as a boy, but I do not regard him as a great artist, or a great writer. As for his poetry, I am quite prejudiced. I was condemned to learn eighteen thousand lines of his *Lay of the Last Minstrel*, and I never forgave Sir Walter Scott. I cannot place Scott in a high category as writer, though he is a good writer.

As for Robert Burns, he was one of the greater geniuses that Europe has produced, one of the initiates—one of the " blood-brethren," who have the cosmic consciousness. With him I should place Leonardo da Vinci and Edgar Allan Poe. Burns had everything that the artist could have. He was really a great poet. He had that curious synchronisation of brain and feeling—the thing that gives " form." It is true that he was dissipated, but mere goodness of life—what I might call " Sunday-schoolishness " —is no proof at all that a man is going to produce great art or any art. The thing that lay behind Burns' art was passion—passion and misery. The novelist who writes neutrally can never produce great work. All great novels are forged in white heat. They are forged by men and women who suffer terribly for their art, who have even thrown everything up, friends—perhaps even wives and children -in its pursuit. Burns produced great art in spite of leading a dissipated life, a dissipation born of misery and sensitiveness rather than vice. Nevertheless, I think the artist who gets the most out of himself is a man who restrains his passions, and expends the energy which would otherwise be spent upon them, in doing his work. As a countrywoman of mine once put it, " He drives lions, and the lions tear him, but he holds them. The others drive sheep." When you come across these neutral artists they are often quite competent as novelists, but great work they never do, for all art is extreme, and the most terrible thing you can say about any man is that he is a " competent novelist." England is full of them !

10. *Is it not the fact that novelists do not write with passion nowadays because they are no longer given to drink as they used?*

I have never tasted alcohol in my life, but I hate teetotallers ! I was once speaking to a great biologist, and he said that the nations which had produced the great artists of the world had all been heavy drinkers. He instanced the Greeks and the Romans. I believe it is all nonsense about alcohol shortening life ; indeed there is much and precise evidence to prove the contrary. But I do not believe that it is necessary to take alcohol in order to produce great art. Great art *has* been done under the stimulus of alcohol, but my objection is that alcohol looses great energy which cannot easily be stored up again. As someone has said, alcohol is an excellent thing for the average man, but the artist should leave it alone, because the artist has within him the necessary power and force without resort to this form of stimulus.

11. *Does not the lecturer consider that George Meredith was a great artist ?*

I have only read one or two of George Meredith's books. It is quite probable I have under-rated him, but Meredith has never made violent appeal to me. That he was an artist I have no doubt.

12. *Is not the average modern novel dull because dealing with the physical sides of sex as it does, it is deficient in romance and leaves out the thrill of the struggle between spirit and matter ?*

That question I am sure comes from a lady of my own country. In Ireland we have always held physical chastity at a high level almost as a fetish. We always have believed also that women and men should have exactly the same rule of life in this respect. While it is true that there can be no fun in life without romance, no romance can turn primarily upon purely physical matters as the modern novelist so often seems to think. This lady asks pertinently as to whether I think that the modern novel ceases to be interesting to people who have that feeling about life because it fails to show the eternal struggle between spirit and matter. Yes, I quite agree. Many of our modern novels are pornographic filth, badly told. The reason why so many of the younger novelists concern themselves excessively with sex is because they lack all that goes to make them real novelists. They throw to the people the bones, or rather the flesh, that will appeal to them, because they have nothing else to give. I have recently been reading a novel blazoned to the world as the masterpiece of a young writer, the opening chapters of which are quite deliberately and superfluously lascivious, having no connection with the story. There are in this book some quite cleverly written pages, but there is not one ounce of thought in it. What a certain type of modern novelist lacks in sensitiveness he makes up in sensuality.

OBITUARY.

FREDERICK WILKIN.—Frederick Wilkin, who died recently at the advanced age of 90, was one of the oldest Fellows of the Society, having been elected 65 years ago in 1865. Born in 1839, he was the youngest son of John Wilkin, sometime financial adviser to William IV. Being debarred from entering the regular army, for which he was intended, by an unfortunate accident involving the loss of an eye, he joined the Honourable Artillery Company and served as a gunner for a number of years. From this time onwards he was a keen student of the development of guns and artillery. Widely read and the possessor of a peculiarly retentive memory, he had many strong interests. Meteorological observation always claimed a good deal of his attention and interest even from boyhood, when he set up a rain gauge on the roof of his home in Spring Gardens. This was followed by a more serious study of weather phenomena, which led to his becoming an enthusiastic and constant observer for nearly 50 years at the meteorological station which he established at Wadhurst.

Archaeology in its many branches also claimed him ; he was a member of the Sussex Archaeological Society, and this archaeological interest, interwoven with a fine knowledge of History, added a greater zest to his travels.

In business life he was for 50 years a director of the British Gas Light Company, succeeding his father, who had also 50 years of service.

In 1905 he founded the "Anthony Wilkin" Scholarship in "Archaeology and Ethnology" at Cambridge, in memory of his elder son, who died in Cairo from dysentery on his return from an archaeological expedition.

During the last few years of his life his sight almost completely failed him, but owing to his characteristic pluck, sense of humour and keen mental alertness, it was difficult to realise that he was the victim of so severe an affliction.

NOTES ON BOOKS

THE ART GALLERY. Vol. I. No. I. *6d.*

The object of this new quarterly is "to bring the arts into everyday life." Now there is no doubt that good taste in furnishing houses is widely regarded as being a matter of convention : some commodities are "high class" because "high class" people buy them. The housewife will buy such-and-such a chest of drawers or picture not because she thinks it beautiful, but because she thinks it " in good taste," i.e., because she thinks it is socially right. She is in fact doing at her end of the scale what a philistine millionaire is doing at his when he buys an original old master.

There ought to be more, and still more, education of taste for all. Is the " Art Gallery " going to help in this important work ? Possibly ; but certainly not when it uses such language as this for a subject title : " Choosing the pictures for Homes of Beauty." Homes of Beauty ! Is the advice given altogether free from conscious prejudice ? The " Art Gallery " may conceivably do good even though it does not lift a finger for the living and struggling painter, but let it stop short at investing reproductions with a shroud of sanctity to which they have no right.

The informative articles, on Impressionism, on Etching, etc., are if anything *too* informative. Pictures do not lend themselves to summary treatment ; they are by nature far more reticent than the novel or the drama, and being in the highest degree concentrated, analysis of them must be elaborate and careful in inverse proportion. A picture will reveal itself to those who have both sensibility and the patience to try to understand it, and not to anyone else

MODERN PRACTICAL MASONRY. By E. G. Warland, A.I.Struct.E. London : B. T. Batsford, Ltd. 25*s*.

Steel and concrete have not driven out stone building. They have, however, made the mason's craft more complex, and it is partly in order to give craftsmen a clear understanding of modern exigencies that Mr. Warland has written this book. Masonry is now often used in conjunction with other materials, it may be half structurally and half ornamentally ; thus it will readily be seen that the subject has become an intricate one. At the same time it is no less true than formerly that the effect of a finished building will depend to an important extent on the ability and taste of the individual masons who shape the features of the surface. Machinery plays a great part in sawing, polishing and turning stone, but the human touch is not excluded, and machines cannot freely carve or sculpt.

At any rate, ashlar, the work of men and machines, is more evidently and sympathetically related to the human scale than are concrete surfaces, which are rather lacking in grace, and perhaps a little shoddy and spiritually vacant. Bold and sinuous designs in concrete, in the manner of Herr Mendelsson, have more than an economic justification ; but they are never likely to become popular. We should welcome Monsieur Corbusier's Cities of To-morrow, but not if they exterminated present and future cities of to-day and yesterday.

The publishers of Mr. Warland's book are not exaggerating its merits when they claim that it is " wonderfully systematic and concise." The illustrations, of which there are more than six hundred, would make it hard even for the slowest wit to misinterpret the text—itself admirably explicit. The various operations that construction involves are thus described twice over ; definitions are provided, and the larger issues with which architecture is concerned are introduced, the treatment of the subject being thereby saved from any danger of baldness. At the same time, as the Principal of the L.C.C. School of Building, Brixton, points out in his foreword, " the most important sections of this volume are those in which the applications of geometry to the setting out and shaping of stonework are developed."

The book ends with a chapter on costing and estimating, hardly less useful in its way than those preceding. Each section has a small bibliography, and there is a glossary and a full index.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY, JANUARY 27..Actuaries, The Institute of, Staple Inn Hall, W.C. 5 p.m. Mr. C. H. Wickens, "Australian Mortality."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Informal Meeting. Discussion on "High Tension Distribution," opened by Mr. G. V. Twiss.

At Armstrong College, Newcastle-on-Tyne. 7 p.m. Mr. L. C. Grant, "The Breaking Performance of High-Power Switchgear and of a New Form of Quenched-Arc Switch."

Geographical Society, at the Aeolian Hall, New Bond Street, W. 8.30 p.m. Mr J. M. Wordie, "The Cambridge East Greenland Expedition, 1929: Ascent of Petermann Peak."

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture X—The Quaternary Period."

University of London, at King's College, Strand, W.C. 5.30 p.m. Major-General Sir F. Maurice, "The Campaign of 1915 on the Western Front. Lecture I—The Situation in the Summer of 1915."

At King's College, Strand, W.C. 5.30 p.m. Prof. R. W. Seton-Watson, "Outlines of British Foreign Policy (1815-80) Lecture II—Canning and the New Diplomacy."

At University College, Gower Street, W.C. 2 p.m. Mr. C. D. G. Douie, "Some Literature of the Great War."

At University College, Gower Street, W.C. 5 p.m. Prof A. V. Hill, "Oxygen and the Recovery Process in Muscle and Nerve." Lecture II.

At University College, Gower Street, W.C. 5.30 p.m. Prof. J. Macmurray, "The Philosophical Approach to Modern Social Problems." (Lecture I).

TUESDAY, JANUARY 28..Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Mr G. Lacey, "Stable Channels in Alluvium."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. F. W. Aston, "Isotopes" (Lecture II)

University of London, at King's College, Strand, W.C. 5 p.m. Dr S. Wright, "Physiology of Posture and Movement." (Lecture II).

At King's College, Strand, W.C. 5.30 p.m. Dr. C. H. Lobban, "Bridges and Bridge-Construction" (Lecture II).

At King's College, Strand, W.C. 5.30 p.m. Prof. Sir B. Pares, "Russian History from Peter the Great to 1861 Lecture II Peter and Russia"

At University College, Gower Street, W.C. 5 p.m. Prof. S. Radhakrishnan, "An Idealist Philosophy of Life." (Lecture III).

At University College, Gower Street, W.C. 8.15 p.m. Miss E. J. Davis, "How London Became the Capital of England." (Lecture II).

WEDNESDAY, JANUARY 29..British Academy, Burlington Gardens, S.W. 5 p.m. Mr. A. M. Hind, "Early Italian Engraving."

Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Mr. A. H. Kennard, "Highways and a Survey of Future Developments."

Electrical Engineers, Institution of, at the Midland Institute, Birmingham. 7 p.m. Captain P. P. Eckersley, "Broadcasting by Electric Waves" (Faraday Lecture). Joint Meeting with the Midland Centres of the Institutions of Civil and Mechanical Engineers.

Eugenics Society, at Burlington House, W. 8.30 p.m. Prof. Holmes, "Family Resemblances in Mental Traits and the Weakness of the Environmentalist Explanation."

Literature, Royal Society of, 2 Bloomsbury Square, W.C. 5 p.m. Ordinary Meeting.

Swiney Lecture on Geology, at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr. Douglas Allan, "Rocks as Records of Earth History. Lecture XI—Geosynclines and Earth Mechanics."

University of London, at King's College, Strand, W.C. 5.15 p.m. Prof G. S. Veitch, "The Social and Political Ideas of Some Representative Thinkers of the Revolutionary Era. Lecture III—The Early English Radicals."

At the London School of Economics, Houghton Street, W.C. 6 p.m. Mr. F. G. Murless, "Office Machinery. Lecture II—Modern Office Stationery."

At University College, Gower Street, W.C. 3 p.m. Dr C. Pellizzi, "La Lirica del Paradiso." (Lecture II).

At University College, Gower Street, W.C. 5 p.m. Prof. S. Radhakrishnan, "An Idealist Philosophy of Life." (Lecture IV).

At University College, Gower Street, W.C. 5.30 p.m. Miss A. S. Cooke, "Recent County Library Developments."

At University College, Gower Street, W.C. 5.30 p.m. Mr. J. H. Helweg, "Northern Mythology." (Lecture II).

THURSDAY, JANUARY 30..Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. H. A. Harris, "Growth of Children in Health and Disease."

University of London, at Bedford College for Women, Regent's Park, N.W. 5.15 p.m. Sir Nigel Playfair, "The Presentation of Drama in the 20th Century. Lecture I—Costume and Production."

At King's College, Strand, W.C. 5 p.m. Prof. R. J. S. McDowall, "Control of the Circulation." (Lecture I).

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. L. Robbins, "The Present Position of Economic Science."

At University College, Gower Street, W.C. 5.15 p.m. Prof. J. E. G. de Montmorency, "Momentous Law Suits and Trials in Various Countries from Classical to Modern Times." (Lecture I).

At University College, Gower Street, W.C. 5.30 p.m. Mr A. D. Lindsay, "The Relations between Ethics, Economics and Politics" (Lecture I).

At University College, Gower Street, W.C. 5.30 p.m. Prof C. J. Sisson, "Two London Theatres in Shakespeare's Day: The Boar's Head and the Red Bull." (Lecture III)

Victoria and Albert Museum, South Kensington, S.W. 5.30 p.m. Mr W. G. Constable, "Canaletto and Eighteenth Century Venetian Landscape"

FRIDAY, JANUARY 31..Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Mr. F. Onions, "Superheating."

North-East Coast Institution of Engineers and Shipbuilders, Bolbec Hall, Newcastle-upon-Tyne. 7.15 p.m. Mr W. G. Thompson, "The Electrical Propulsion of Ships."

Royal Institution, 21 Albemarle Street, W. 9 p.m. Lord Rayleigh, "Iridescent Colours in Nature."

Swiney Lecture on Geology at the Royal College of Science (Old Building), South Kensington, S.W. 5.30 p.m. Dr Douglas Allan, "Rocks as Records of Earth History. Lecture XII—Conclusion—The Development of Geological Ideas."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "Russian Literary Criticism. Lecture III—Belinsky (1834-48)."

At King's College, Strand, W.C. 5.30 p.m. Prof. Caroline Spurgeon, "Leading Motives in the Imagery of Shakespeare's Tragedies."

At University College, Gower Street, W.C. 5 p.m. Mr. G. P. Wells, "Comparative Physiology." (Lecture III).

SATURDAY, FEBRUARY 1..L.C.C. Horniman Museum, Forest Hill, S.E. 3.30 p.m. Mr. D. Martin Roberts, "London in the Tudor Age."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Dr. R. W. Chambers, "Sir Thomas More and his Frien" (Lecture II).

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4028 *FRIDAY, JANUARY 31st, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2

NOTICES

NEXT WEEK

MONDAY, FEBRUARY 3rd, at 8 p.m. (Cantor Lecture.) HAROLD WRIGHT (of Messrs. P. and D. Colnaghi and Co.), "Three Master Etchers: Rembrandt, Méryon, Whistler." (Lecture III.)

The lecture will be illustrated by lantern slides.

WEDNESDAY, FEBRUARY 5th, at 8 p.m. (Ordinary Meeting.) SIR WILLIAM CLARE LEES, O.B.E., Member of the British Economic Mission to South America, "Some Aspects of the Question of Trade with South America." SIR EDWARD T. F. CROWE, K.C.M.G., Comptroller General, Department of Overseas Trade, will preside.

FRIDAY, FEBRUARY 7th, at 4.30 p.m. (Indian Section.) G. H. TIPPER, M.A., F.G.S., M.I.M.M., late of the Geological Survey of India, "Recent Mineral Developments in India." SIR DAVID T. CHADWICK, C.S.I., C.I.E., Secretary, Imperial Economic Committee, will preside. The paper will be illustrated by lantern slides.

Tea will be served in the library from 4 o'clock.

COMPETITION OF INDUSTRIAL DESIGNS

The seventh annual Open Competition of Industrial Designs will be held in June next, and full particulars can now be obtained on application to the Secretary of the Royal Society of Arts.

Over £1,900 will be offered in prizes and scholarships in the various sections, distributed as follows:—Architectural Decoration, £276 2*s.*; Textiles, £693 10*s.*;

Furniture, £102 10*s.*; Book Production, £31 10*s.*; Pottery and Glass, £52 10*s.*; Advertising (Posters, Showcards, etc.), £605. In addition to the above a Travelling Scholarship of £100, given by Mr. James H. Hyde, a Fellow of the Society, is offered for competition in connection with the Architectural Decoration and Textile Sections, and the Art Congress Studentship, of the value of £50, may be awarded at the discretion of the Judges in any section of the competition.

After the work has been judged, a number of selected designs will be exhibited in London, and subsequently at suitable centres in the provinces. In this way they will be brought immediately to the notice of those manufacturers who are likely to be specially interested in them.

It is intended to confer the Society's Diploma on any candidate whose work reaches a very high standard of artistic ability and also shows practical knowledge of the materials and processes of his trade.

A Bureau of Information has been established at the Royal Society of Arts for the registration of the names and addresses of exhibitors who desire to obtain employment as designers. These lists are at the service of manufacturers in search of designers.

NINTH ORDINARY MEETING

WEDNESDAY, JANUARY 22ND, 1930. SIR RICHARD A. S. REDMAYNE, K.C.B., M.Sc., M.Inst.C.E., in the Chair. A paper entitled "Observations on the Mining Laws of the British Empire" was read by MR. GILBERT STONE, Barrister-at-Law. The paper and discussion will be published in the *Journal* at an early date.

CANTOR LECTURES

MONDAY, JANUARY 27th, 1930. DR. E. F. ARMSTRONG, D.Sc., LL.D., Ph.D., F.R.S., in the Chair. MR. HAROLD WRIGHT delivered the second of his course of three lectures entitled "Three Master Etchers: Rembrandt, Méryon, Whistler." The lectures will be published in the *Journal* during the summer recess.

HISTORY OF THE ROYAL SOCIETY OF ARTS

Further copies of the History of the Royal Society of Arts by the late Sir Henry Trueman Wood, the existing supply of which was recently exhausted, are now available, and can be obtained, price 15*s.* net, on application to the Secretary. The History, a large octavo volume of 558 pages with a large number of illustrations, gives a well documented account of the many and various activities of the Society from its foundation in 1754 to the year 1880.

NEWS OF THE WEEK

"*Unfortunately the sense of beauty in the country is not so widespread as the sense of comfort.*"

Mr. Arthur Greenwood, M.P.,
Minister of Health.

"*I suppose we are the most untidy nation in Europe.*"

Miss Susan Lawrence, M.P.

"*I believe the British workman can lick creation if you do not hamper him with regulations.*"

Mr. H. R. Oswald,
H.M. Coroner.

"*Of what use is beauty to a generation which is itself maimed and vulgarised?*"

Miss Winifred Holtby.

The Public and the B.B.C.—Sir John Reith, speaking on "Business Management of the Public Services," said :—

> "I am as certain as anything that to set out to give the public what it wants, as the saying is, is a dangerous and fallacious policy, involving almost always an underestimate of the public's intelligence and a continual lowering of standards."

The business man (when he wants to do anything, the artist with his clearer vision suggests) always says "but the public is not educated up to that." We do not agree with Sir Henry Bunbury, who, in the discussion, described this attitude as bureaucratic.

Aesthetic Medicine.—Lord Moynihan, opening an artists' exhibition in Leeds City Art Gallery yesterday, said that the distinguishing feature of the present day was the breathless haste with which everything was done, and the incessant, almost intolerable din with which so many things were accomplished.

Posterity, he feared, would say of us that we were a materialistic people, and that our re-action from the noble idealism and unequalled effort of the Great War was expressed in raw, crude materialism in which, for a time at least, the affairs of the spirit were in danger of being submerged.

It was, therefore, to be desired that we should seek an antidote to those poisonous agencies, and find, somehow, solace for the spirit and refuge from the social mischiefs of our time. It was essential that æsthetic medicine should be taken to produce that effect. Beauty was a very real and precious thing necessary for social health.

The Goodwood Beeches.– The sale of these is on February 6th, and there are not many days left. Mr. Hilton Young, in an interview with *The Observer*, says :

> " There is one problem that it is not very easy to solve, and that is how to save the fine old trees that are being destroyed so ruthlessly everywhere. After all, one cannot merely prohibit their destruction. That would be confiscating their value. A question of compensation is raised. Where is it to come from ? Are people willing to be taxed or rated to save the trees and woodlands ? I should be myself, but I have no business to assume that others are unless they have said so expressly, and they have not done so yet. Perhaps a law might be made that no one shall cut down a hardwood tree without planting another."

The County of Sussex will be appreciably poorer by such destruction. Will the County Council intervene and suggest at least a stay of execution before it is too late.

— ——

Cambridge. The University Library.

The following is taken from *The Observer* : –

> "Tuesday's Discussion was a necessary stage in the process of getting our new Library, but in itself it was not very illuminating. The Librarian explained the modifications introduced by Sir Giles Scott, and various members of the special Syndicate replied to points raised in the debate. Criticism came from Mr. Gordon, who refused to be convinced that the lighting was going to be adequate, and from Mr. Rottenburg, who wanted an open competition, even at this late hour, to ensure that we should have not merely a good building but the very best that could be got. The matter will now presumably go to a vote, and the present scheme is fairly certain to be accepted, simply because further delay will be considered a worse evil than putting up with a building that is at any rate adequate, though not calculated to arouse enthusiasm. Some folk, however, and possibly a good many, will continue to regret that the Senate should be faced with a " take-it-o.-leave-it " position, and no opportunity of seeing even one alternative design."

May we suggest that so important a public building and such a large expenditure of money should not be risked if by a little delay a greater degree of perfection might be reached. No decision should be come to until a complete model showing the building in its relation to the site and its adjoining buildings and a large scale section of the Library are made. No Lay Committee can ever follow working plans, and perspective sketches except of the finished building, are misleading. We implore the University Authorities to spare no expense to be sure that this building is ideal for its purpose and worthy of a great University.

Eastcote, Pinner.—The Society having taken a hand in the preservation of what is left of old Ruislip, is appealed to in regard to the invasion of this peaceful spot not far away by the irresponsible speculators. " Can you conceive a more diabolical torture than being condemned to look out from your window on the result of such handiwork as one passes en route from the station. Cannot something be done to prevent this vandalism on what is, without doubt, the most beautiful outlook in the neighbourhood, and one of the few open spaces left ?

Why should we, who have spent so much on our houses, and helped to make this little bit of road the pleasant spot it is, lose suddenly all the amenities of the situation ? " So writes a Fellow of the Society, and he may rest assured that the Preservation Committee will use all their influence to help. It reminds us of the case of the man in Dorsetshire who bought an old derelict farmhouse to convert into a peaceful residence for his retirement from the Civil Service and is living in this, half restored with unplastered walls, as all his available money has gone in buying land he does not want, to keep out hideous bungalows which the Council pass without even a protest.

Powers of Local Authorities. Sir Fabian Ware says that the only way of preventing bungaloid and other ugly growths is to give the local authorities power to control elevations. What about the standardised designs produced by local authorities and carried out under their direction ? If educated men of Sir Fabian Ware's calibre will get elected by the force of public opinion on the local Council all might be well. As far as the Cotswolds are concerned, the only way is to standardise the local materials to such a pitch of organised efficiency that it will be possible to use only the local stone and stone tiles. There should be no compromise until this is achieved. It can be done, but only by direct labour, efficient transport, and the most exact business methods with full allowances for cash discounts. To such methods the profession mind of builders and other trades are opposed. The beautiful mediæval forms of building must in the interests of beauty be linked to the more mechanical methods of to-day. Educated mass production is inevitable.

Savile Place.—Hidden away behind the massive new shops of Regent Street, Savile Place, a picturesque corner of Old London is to be demolished to make way for a new thoroughfare. This will be a distinct loss to the West End. With it goes the attractive Alpine Club's Gallery, associated with so many interesting exhibitions in this quiet corner off Bond Street. We fail to see how this will relieve the hopeless congestion of Bond Street. It seems a policy of nibbling at a problem with no compensating gain and a loss which will be regretted directly the inhuman builder's destructive hammer is sounded. Will the authorities concerned produce a plan to demonstrate the value of such destruction ?

Advertisements.- The Scapa Society formed as long ago as 1893 is reaping the reward of the patient work of the late Mr. Richardson Evans, the first Honorary Secretary of this Society. The knighthood conferred on the Acting Secretary of the Society since 1914, was surely merited for his long and untiring services in calling attention to the abuses of advertisers. The country might have been in an even worse state but for the work of this Society. The Society does not take its name from the inlet known as Scapa Flow, but it is difficult to recall that it is a "Society for checking Abuses of Public Advertising." We suggest that as some of our Fellows are no doubt rightly concerned in advertising, and they may not have seen *The American Mercury* for December 1929, they would do well to read the following by Mr. George Jean Nathan.

> *Advertising.*—The profession of advertising, which has made such enormous strides in the last decade in the direction of intelligence, good-looking copy and public persuasion, impresses me, for all its noteworthy advancement, as being in certain quarters still somewhat less foxy than it imagines itself. I allude to the indulgence of a number of its professors in the theory of "catching the eye" at all costs and to the trapping of that eye often at the expense of making the advertised article itself elude it.
>
> A devoted reader of advertisements, partly out of curiosity, partly out of the common human impulse to discover something better than that which one is currently given to using, and even more so because present-day advertising is often much more interesting than the literary reading matter in the same journal, I am sometimes struck by the lengths to which the advertising gentlemen go to catch this eye of mine and by the subsequent reflection that this eye of mine is all that they have caught. I have before me, as I write, a half-dozen examples culled from various gazettes. I cut them out for the simple reason that, after seeing them in many places many times, it suggested itself to me that, after my eye had been caught, I had actually come away with no idea as to what the catching of my eye was all about, with no inquisitiveness to learn why my eye had been caught, and without the slightest eagerness to learn what the product advertised was.
>
> One of these advertisements is one-third occupied by a lithograph showing two very pretty girls in one-piece bathing suits waving at a small can of corn. The two sweet ones' shapes have attracted me optically a number of times, but what they have to do with the corn that paid for the advertising or what the corn's name is, I did not trouble to learn until it occurred to me to write this article. Another shows a very toothsome miss revealing her shapely limbs far above the knees. I have just discovered that, in the small type occupying one-fourth of the copy, she is supposed to advertise a certain brand of cathartic. Another, taking up a full page, has a beautiful view of Lake Como occupying more than half of the page; I have often admired it and feasted my eyes upon it; and I have just found out that what is advertised below is a brand of face-powder. Still another, a finely executed piece of copy, has a lithograph showing an episode in one of the fairy tales; the original painting, nicely reproduced, has often caught my eye; but I have only now taken the trouble to read what is below it and to learn that what is advertised is a perfume. And so with the others. That they capture the passing attention is certain. But that, having captured it by devious and often irrelevant means, they persuade it to read the advertisement itself is, if my case is at all typical, doubtful.
>
> In other days, the advertising professors aimed also, of course, at catching the eye, but, if memory serves, less with such extrinsic subjects than with the name of the advertised product itself. That the technique was successful is established by the fact that almost the only advertisements of thirty years ago that we adults still remember to-day were those that, without such fol-de-rol, hit the nail directly upon the head, either with the simple name of the article, with a simple picture of the package of goods or with a closely allied catch-phrase.

> The youngster of thirty years ago now grown to manhood recalls vividly, even in this crowded day of much more greatly advanced and developed advertising strategy, Carter's Little Liver Pills, the De Long Hook and Eye (" See that hump "), Chas. H. Fletcher's Castoria (" Children cry for it "), Sapolio, the Gold Dust Twins, Pond's Extract, Dr. Munyon, Electro-Silicon, Mennen's Talcum Powder, Nestle's Food, Dr. Lyons' Tooth Powder, Dr. Piso's Cough Syrup, Radway's Ready Relief, Beeman's Pepsin Gum, the Columbia Bicycle, Kleinert's Dress Shields, the Winton Automobile, the Seven Sutherland Sisters' Hair Restorer, the Regal Shoe, Hood's Sarsaparilla, St. Jacob's Oil, Hires' Root beer, Wilson—That's All, Quaker Oats, the R. & G. Corset, Heublein's Cocktails, Sen-Sen, Madame Yale's Beauty Preparations, Anheuser-Busch—to say nothing of Pabst's Blue Ribbon, the Cremo Cigar, the Six Little Tailors, Hyomei, Sweet Caporal Cigarettes, Underwood's Devilled Ham, Smith Brothers' Cough Drops, Burpee's Seeds, Sozodont, Pearline, Adams's Tutti-Frutti Gum, Mail Pouch, Navy Plug and Danderine. Almost every one of these, one reflects, was advertised with a literal directness of copy. They were presented directly to the public, their names set forth simply and conspicuously or with a simple picture of the package or article plainly in view at the very head of the copy. I do not, of course, forget one of the best remembered of them all—Pears' Soap—with the elaborate lithograph of the child who wouldn't be happy until he got it, but even in this case what it was he wouldn't be happy until he got was emphatically announced to the eye. Some of the other products mentioned were also pictorially advertised, but the pictures were those of Beeman, the Seven Sutherland Sisters, St. Jacob and Regal shoes—or of a Sozodont user's teeth, the Smith Brothers' distinguished whiskers or a Wilson whiskey bottle ; they were never those of the Bay of Naples by moonlight, Mack Sennett bathing cuties, or the flags of all nations.

Societies with more than two letters are seriously handicapped, and are constantly asked even by those seriously interested, what C.P.R.E. means. In view of the recent outburst of indignation in regard to unpleasant advertising, it is astonishing to read in an account of the Scapa Society, the following written in 1926 :--

> Happily the Law, even as it stands, does to a large extent provide means of remedy. For the protection of towns and villages an extension of the principle of control was needed. An Act for this purpose has been placed upon the Statute Book this Session (1925). The measure was drafted in conference with the Advertising Committee of the London Chamber of Commerce (upon which the Bill Posters' Association and other advertising organisations are represented). A clean sweep might be made of many of the things that offend, if County and District Councils exercised the powers conferred upon them by the Advertisements Regulation Act of 1907 and this supplemental Act. In each district those interested in preventing defacement should combine to use their personal and collective influence with members of the municipal body (County Council, Corporation, Borough Council or Urban District Council, as the case may be). A Memorial or Petition would be a convenient way of approach.

REPRINT OF ALDRED LECTURES

The three Aldred Lectures on " Nomadic Movements in Asia " by Sir E. Denison Ross, C I E., Ph.D., have been reprinted in pamphlet form (price 2*s*. 6*d*.), and can be obtained from the Secretary, Royal Society of Arts, John Street, Adelphi, W.C.2.

A complete list of Cantor, Howard and other lectures, which are available in pamphlet form, can be had on application.

PROCEEDINGS OF THE SOCIETY

INDIAN SECTION

FRIDAY, JANUARY 10TH, 1930

THE MARQUESS OF READING, P.C., G.C.B., G.C.S.I., G.C.I.E., G.C.V.O., in the Chair

THE CHAIRMAN said it was a special pleasure to him to preside on the occasion of a lecture by Sir Basil Blackett, owing to the high regard he had for him, and to the great importance of the subject matter of his address—the Economic Progress of India. India was occupying the minds of all at the present moment, especially in regard to economic development which held so prominent a position in British public affairs It was impossible to discuss the economic development of a country without regard to finance and also to political problems. In relation to finance, the meeting had the advantage of having Sir Basil, who was himself an authority on the subject. In regard to the political problems, the present occasion was neither the time nor the place to attempt to find the solution of the various perplexities in India, nor to take part in the acute controversies which dominated the situation at the moment. Nevertheless, in whatever Sir Basil might be saying, he felt certain that the thoughts of many would travel necessarily to those problems, but there he hoped they would remain on that occasion. In finance Sir Basil had already proved himself, both in India and elsewhere. Although everyone present knew of him, perhaps he (the Chairman) was in a special position to speak of Sir Basil, inasmuch as he had had relations with him at the Treasury during the war, and on several occasions on missions to the United States of America, where the country and himself, as one of its servants, had had the benefit of Sir Basil's valuable assistance. It was because he had known so much of him, and of the advantage it had been to the country to have guidance from one with both theoretical and practical knowledge of finance, that he had been so anxious that Sir Basil should give his help in India. Sir Basil went to India. It was unnecessary to say anything of what had happened there, save that he wished to express the satisfaction felt by all those who were interested in India in knowing that Sir Basil was for five years at the head of India's financial affairs. He had been for that period Finance Member of the Viceroy's Executive Council, and during the greater part of it he had been associated with himself (the Chairman) in the Government of India. Sir Basil would be the first to admit that conditions were, at any rate for a time, favourable to him in India. He might not admit, but it was the fact, that he was the man who knew how to take the best advantage of the conditions vouchsafed to him.

He (the Chairman) had no intention of speaking at the moment about economic progress in India, save that he desired to emphasise one aspect of industrial development which was often not appreciated and understood in this country. The industrial development was largely of thirty years' standing—from the beginning of the present century—but as time had gone on, and industrialism had played a greater part in India, there was no doubt that many Indians were associated in the progress and development of industry, some in technical capacities and in service, but, of course, a far greater number as investors in various companies, either in providing capital for the enterprise at the start, or in the purchase of shares, and were therefore taking their part in the joint stock enterprises of the country. It was not, perhaps, sufficiently realised that in India many Indians held large numbers, often the majority of shares in various companies which carried on industrial work in India, and all would agree that nothing could be better for India than that Indians themselves should feel that they had a part in the development of the prosperity of their country.

Without further introduction, he would call upon Sir Basil to address the meeting.

Sir Basil Blackett prefaced the reading of his paper by expressing on his own behalf, and he was sure on behalf of all those present, their sincere appreciation of Lord Reading's kindness in coming to preside at that meeting. He felt compelled to add a special word of blushing thanks for the kind remarks which the Chairman had been pleased to make about his (the speaker's) services in India.

The following paper was then read:

THE ECONOMIC PROGRESS OF INDIA

By Sir Basil P. Blackett, K.C.B., K.C.S.I.

The title of this paper lends itself to many different methods of treatment, and a choice must be made between them. There are obvious objections to attempting to treat of India as a single whole with statistics conveying a suggestion of a non-existing homogeneity. It is tempting to approach the subject geographically and study India province by province. Yet in a paper of this sort it is all but impossible to do otherwise than to make a comprehensive survey, and I propose in the main to ignore the fact that India is a sub-continent which contains greater political, ethnic, cultural and economic differences than does Europe, and to proceed as if India were a real economic unit.

In doing so I have more than one justification. Even Europe is at any rate potentially a single economic unit, and more and more people to-day are beginning to think and speak of Europe in terms suggesting economic unity. The mountains on the North-West frontiers of India, through whose passes her invaders swept down upon her in earlier days, and the seas across which her European visitors came first to trade and then to conquer, have become, thanks to the strong military and naval defence forces which India's partnership in the British Empire secures for her, protective geographical boundaries within which it would seem impossible for India to move otherwise than towards economic unity. The island of Ceylon is not included in this unit, just as the British Isles seem destined to keep outside any probable European economic unit. Ceylon has a separate customs tariff from that of India, and though within the sphere of influence of the Rupee the history of Ceylon shows a curiously different, if parallel, economic and political development. In the statistics which I put before you Burma must necessarily be included as part of India. For a generation or more Burma has been politically united with India and included within the ambit of the Indian customs tariff. Yet it is difficult to believe that such union is natural, and in contemplating the future I find myself driven frankly to regard Burma as an altogether separate country, destined inevitably to a separate economic and political development.

The Indian customs tariff provides the strongest justification of all for treating India as a single economic unit. In so far as population is concerned, India is the biggest free trade area in the world, for I suppose that it will be admitted that China cannot in present circumstances, with its affection for likin and similar internal exactions of the nature of customs duties, be regarded as a free trade area. In India there are 320 million people inhabiting an area of nearly two million square miles of contiguous territory with no customs houses to impede the flow of exchangeable goods from the Khyber to Ramesvaram, from the Persian border of Baluchistan to the Chinese frontiers of Assam, and down from Assam to the Siamese boundary of Burma. It is true that there are some minor and occasionally embarassing customs barriers, due to the existence within the Indian sub-continent of numerous Indian States, small and great, some of which have retained the right to impose customs duties of their own. But these exceptions to freedom of trade can justifiably be ignored since in fact only Kashmir enjoys exemption from the general customs tariff of India, and the internal State customs duties are scarcely more than octroi duties.

If India were in a stage of development comparable to that of the nations of Europe or the United States of America, this vast unhampered home market in a land enjoying extraordinary climatic and geographical variations could not fail to place her in the forefront of economic wealth. Why is it that the extraordinary poverty of the masses is the salient feature of life there? Some observers are satisfied to find an explanation in describing India as a case of arrested economic and political development, yet the poverty of the masses was no less striking in the times of the Moguls, when India was at a stage of development not very different from that of contemporary Europe. It is not necessary to quarrel with the view that both politically and economically India to-day bears evidence of arrested development, but the explanation of the extreme poverty of her masses must be sought in some other direction. The identity of the phenomenon to-day and in the time of the Moguls is a sufficient answer to those Indians who, conscious of the contrast between India and modern Europe, would attribute all that is amiss in India to British rule. British rule—or, more strictly speaking, the impact of the West upon India—has indeed faced her with many difficult problems. It is probable that if an India could be imagined which had remained until the present time untouched by Europe, her population would be less than half of what it is to-day, and she would not have had to cope with the task of assimilating an alien civilisation which for the first time in India's history has been too strong for Hinduism's power of absorption. But the impact of the West would have been as powerful and perhaps more destructive but for the protection of British rule. The standard of living of her peoples would certainly have been even lower than it is, and their poverty even more extreme. There can be no doubt as to the fundamental reason for the peculiar economic conditions of India. It is to be found in the Hindu social system, in the doctrine of Karma, in the absence of active effort for material progress, in the presence of the active determination of Brahmanism to maintain and perpetuate the age-old social outlook enshrined in the caste system. The fundamental conservatism of India is scarcely credible to the Western mind; the census of 1921 discloses the fact that in spite of all the recent developments of facilities for communication and the growth of industrialism, not more than 9% of the people of India live outside the district of their birth.

Up to the end of the nineteenth century the British Raj in India seemed contented to believe that its function was confined to providing law and order and good government for peoples who had suffered untold miseries in the chaos of the eighteenth century following on the break-up of the Mogul Empire, and scarcely less intolerable evils under the tyrannous rulers of earlier centuries. Up to this date, too, the blessings of British rule and British justice were a favourite theme with Indian orators, in the mouths of the Western-educated intelligentsia that was beginning to feel its way towards participation in the political life of India. The advent of Lord Curzon and the stirrings of political demands for a greater measure of self-rule led at the beginning of the twentieth century to a new economic outlook in the Government of India. India has always been predominantly agricultural. The statistics indeed suggest rather surprisingly that even to-day the extent to which the population is dependent on agriculture is increasing rather than decreasing, and the census of 1921 registers 72.78% of the people of India as dependent on agricultural and pastoral pursuits, as compared with 72.2% in 1911, and 66.5% in 1901. There are reasons, however, for regarding the figures prior to the 1911 census as unreliable, and owing to changes in classification adopted in 1911 and continued in 1921, it is only the figures of the last two censuses that are safely comparable. In any case it is not open to doubt that since 1900 there has been a steadily increasing tendency, consciously fostered by the Government of India, to introduce—in some cases to re-introduce—organised industries of various kinds. In the adoption in 1923 of the principle of discriminating protection in the customs tariff the Government of India, with the full support of the Council of State and Legislative Assembly, was avowedly aiming at producing a better-balanced economic organisation, and providing commercial, industrial and technical openings for the educated young men of India, hitherto driven by the absence of large-scale industry and manufacture to the overcrowded clerical and legal professions.

In order to illustrate the changes which have been taking place in India since 1900, I have prepared the accompanying statistical tables. My statistics obviously cover only a portion of the ground, and my endeavour to limit their scope may make them appear incomplete. I have resisted the temptation to extend my survey into the regions of educational, hygienic and vital statistics, in spite of the fact that the work being done in social service is perhaps more significant for the future economic well-being of India than any other.

Generalisations based on statistics are nowhere more misleading than in a study of the conditions of India as a whole. In vast areas of the country there have been scarcely any perceptible changes since 1900. Profound changes have taken place in the coalfield areas of Bengal and Bihar. At Jamshedpur in Bihar a big steel manufacturing town of over 100,000 population has sprung into life where in 1900 there was nothing but jungle inhabited by a primitive tribe almost in the bow-and-arrow stage of civilisation. Yet these developments are no guide to what is happening in Malabar. No one in the West would think of regarding the growth of the oil output of Roumania as significant for conditions in Portugal. Yet this error is constantly perpetrated when a European audience listens to a talk about India. I have recently been reading a very remarkable book, remarkable both for its erudition and for its comprehensive grasp of big secular tendencies and ideas, by a German writer named Hans Kohn, entitled "Geschichte der Nationalen Bewegung im Orient" ("History of the Movement towards Nationalism in the East.") I have found it most suggestive and stimulating, but I could not help feeling that even so careful a student of events as the author was making a similar error, deduced from his study of the utterances of selected Indian leaders. It is a great mistake to ignore the significance of the thought and ideals of the intelligentsia in India. They are the deliberate product of British efforts to lead India onwards towards self-government, and it is only through them that we can hope to reach our goal of a satisfied prosperous India within the fold of the self-governing units of the British Commonwealth of Nations. Yet probably 300,000,000 out of the 320,000,000 inhabitants of India are unaware of the passing of the Government of India Act of 1919.

The economic changes which these statistics reveal and illustrate are very striking. Take the figures of iron and steel production for example (Table 18). In 1927/8 Jamshedpur produced 644,296 tons of Pig Iron and 408,343 tons of finished Steel where none was produced in 1900. Take the Jute figures (Table 12); 36 mills and 317,348 spindles in 1900, against 93 mills and 1,083,816 spindles, in 1926/7 - with a capital of 4.09 crores in 1900 and 17.34 crores in 1926/7—and in this connection remember the further very significant fact that whereas in 1900 there were very few Indian shareholders in the Jute companies there are to-day many more Indian shareholders than European, holding some two-thirds of the issued capital, and yet content to entrust the management mainly to the hands of European—I might be more specific and say Scottish—business men, in whose experience and integrity they have learned to feel confidence. Remember too that the revival of the biggest iron and steel concern in Bengal was mainly due to a great Bengali, Sir Rajendra Nath Mukerjee, working with and trusted by European colleagues, and that the Tata Iron and Steel Works were due entirely to the initiative of a great Parsee, Sir Jamsetji Tata, and that European and Indian technicians and engineers are working happily side by side at Jamshedpur on terms of complete equality. There was nothing in 1900 even to suggest that such things would be accomplished everyday facts in 1930.

I want to bring out a further point in regard to these economic events. These changes are the deliberate outcome of the policy of the Government of India since the days of Lord Curzon's Viceroyalty. They have often been represented as being unpalatable to British opinion, and there is no doubt that particular interests in this country have not infrequently looked askance on the development in India of industries which threaten the exports of the corresponding products of Great Britain. What has happened in regard to India is exactly parallel to what has happened in regard to the Dominions. The habit of regarding the rest of the Empire as concerned mainly in producing raw materials and foodstuffs with which to pay for manufactured goods exported from this country dies hard, and this is especially true of the British attitude to India, which is and must remain predominantly an agricultural country. Indeed, it is necessary in the interests of the vast mass of the peoples of India that no pains should be spared in fostering and improving her agricultural production. Side by side with the industrial developments of the last thirty years, increasing attention has been paid to scientific research, pure and applied, in the field of agriculture. But in India, as in the United Kingdom, the problem of making the products of research acceptable to and accepted by the farmer is an intractable one.

During the last thirty years the development of Indian industries has been deliberately and actively fostered by the Indian Government. From Lord Curzon's time onwards the necessity of making the economic life of India less lopsided, of providing useful spheres of practical activity for the educated Indian, of modifying the unduly literary bias of education in India and giving opportunities for technical training, have been increasingly realised and insisted on. In 1904 Lord Curzon's Government passed the first Co-operative Credit Societies Act. Since 1919 the so-called Fiscal Convention has been in operation under which, if there is agreement on a fiscal question between the Government of India and the Central Legislature, the Secretary of State for India will not intervene to enforce the overriding powers of the British Government and Parliament. Since 1923 the policy of discriminating protection of Indian industries has been the accepted policy of the Government. Protection has been given to Steel, Paper-making and other industries ; the Cotton Mills have the protection of an 11% revenue duty and the Cotton Excise Duty has been abolished. During the years I was in India I had the good fortune to take a hand in securing the establishment of a Security Printing Press at Nasik, where India now makes all her own stamps and stamped documents and all her own currency notes, instead of importing them, and a Silver Refinery at Bombay which has increased the importance of Bombay as a great silver market, besides assisting the Government in disposing of its inconveniently large holding of silver rupees. This is a legacy of the war-time expansion, and the volume of the silver rupees in the Paper Currency Reserve has also been increased by the gradual growth of the banking habit in India, the earnest effort to foster banking being one more evidence of the Government of India's policy of the economic development of India. The figures regarding co-operative banking are especially significant in this connection.

This will perhaps be the right point to express my indebtedness to Mrs. Vera Anstey's recently published book on " The Economic Development of India." It came into my hands when I was in the middle of preparing this paper. Had it come a little earlier it would have saved me much labour in digging out statistics. It contained figures almost exactly on the lines of those I was laboriously accumulating. The book is valuable for its sober and exhaustive presentation of the economic facts, and its complete absence of bias. I hope it will be carefully studied by both British and Indian readers, business men as well as students. I am specially grateful to Mrs. Anstey for bringing out clearly the change in the attitude of the Government of India towards economic and industrial questions initiated by Lord Curzon, on which I have laid great stress but which has been rather strikingly overlooked in many quarters hitherto.

The effect of the West on India, and in particular the reaction upon India of the industrial revolution in Great Britain and the consequent influx of machine-made goods, while providing the masses of India with better articles at cheaper prices, had during the nineteenth century seriously impaired the village economy of India, and had reduced the output and the value to India of many of the indigenous manufactures, previously exported, for which India was famous, for example her muslins. The Indian Government of the day was dominated by the ideas of the Manchester School and restricted its intervention in economic spheres and its taxation to the minimum needful to maintain law and order.

The Cotton Mill industry in Bombay, which received a great impetus at the time of the American Civil War in the sixties of last century, was almost the only instance up to the end of the century of the successful implanting of big scale manufacture on Western lines. Since 1900 every change has been in the direction of the growth of new industries. The figures of India's imports and exports (tables 14, 15, 16) offer an interesting illustration of the new tendencies. Though there has been a very big increase in the total turnover, it has not been so great as might have been at first sight expected. According to the League of Nations figures, since 1913 India's external trade has grown by 49.1%, while that of Great Britain has grown by 52.3%, that of Canada by 124.7%, and that of the United States by 111.4%. The total of the external trade of the world according to the same compilation has grown by 66.2%. I have more than once noticed these figures used to suggest that India is lagging behind other countries. On closer examination however I think the lesson to be drawn is very different India is now producing for herself a large number of the goods—and indeed of the services also—which she formerly imported, and is using up internally for human consumption and for consumption in her own manufactures a larger volume of her own raw materials and foodstuffs. I have already spoken of the establishment of the Government's Security Printing Press and of the growth of the steel industry. The figures of imports, exports and consumption of cotton goods (Tables 9, 10 and 11) are a particularly good example of what has been taking place. The figures relating to rice consumption (Table 13), showing an increase of nearly 50% in the rice retained for internal consumption, tell the same story. Even allowing for the growth of population which in India continually threatens to overtake the food supply and to trench upon the narrow margin of subsistence, the masses of India are better fed and have improved their standard of comfort. Low as the latter remains, it is sensibly higher than it was a generation ago, and in addition, thanks to irrigation and the great extension of means of communication, the dangers of really severe famine seem to have been overcome.

The industrialisation of India, however partial, is not without evils, some of them similar to the evils of our own industrial revolution, and some peculiar to India. The problem of the industrial worker in Bombay, temporarily a townsman but without desire to become an artisan, with his heart in his own agricultural village, whither he constantly returns, must seem at times disheartening and even insoluble. Vital statistics are peculiarly unreliable in India, but whatever the exact figures may be, the death rate, and even more the infantile mortality, in places like Bombay and Poona, are appalling. More than once since the Montagu-Chelmsford Reforms, as for example during the controversy over the Reserve Bank Bill, the Central and Provincial Legislatures have borne witness to the possibilities of severe friction between urban and rural interests ; and the inevitable predominance of the urban intellectual among the politically minded Indians gives constant preoccupation to the Government, and especially to the District Officer. Yet the economic tendencies of the last thirty years are bound to continue, and no one who takes the long view of the interests of India would have it otherwise, whatever sentimental regrets may be felt at the disappearance of the medieval and romantic setting which still adds glamous to a westerner's picture of India. It is useless to deplore the infatuation, as it may seem, of the politically minded Indian with what is called politics, and his absence of interest in the economic needs of India and the risks of economic deterioration owing to unwise political action. These are the natural consequences of the paucity of practical economic outlets for the activities of the educated Indian. As economic opportunity grows, increased reality will be brought into politics. Already in the provincial legislatures, and especially in the Punjab, practical men are beginning to learn by experience that their doings as legislators are intimately connected with their private comfort and prosperity in their homes and villages.

Nor, in my opinion, are the economic interests of this country and of the Empire in any way divergent from those of India The more prosperous and progressive India becomes, the better for this country both as a great trading nation and as the political centre of a great Empire. The next few decades may in all probability see the rapid growth in the world of a small number of large economic units, consciously moving towards more intimate economic union. There is no need to picture these units as mutually hostile and antagonistic. Even if they seem to be competitive, their differentiation may well be regarded as little more than a reasonable division of labour with a view to better economic results, valuable in helping mankind to avoid excessive standardisation, and part of the process of advance towards peaceful co-operation throughout the world. The motive behind the growth of such economic units is similar to the motive which has driven Germany and is driving this country to what is called rationalisation. The national boundaries of one country, unless it be continental and exceptionally favoured as in the case of the U.S.A., are too restricted for modern methods of production and marketing, just as the time has gone by for intensive competition between two iron and steel plants in the same street of the same town. Many minds are thinking of the creation of a single European economic unit. This country cannot merge itself in Europe. If it is not to be left behind, an isolated derelict, it must find its place in a great Imperial Economic Unit. Historical traditions, considerable cultural unity, a common political bond, the widespread use of a single language, all offer valuable opportunities for rational economic action within the Empire as a unit. Without India the idea of an Imperial Economic Unit suffers a grievous shrinkage, and partnership in such a unit not only offers India a proud place in the world, but seems indispensable to her growth and balance. If in the last thirty years of continuous political unrest India has made such enormous economic progress, if even to-day India with its poverty-stricken masses is of such significance to the Empire, what will the producing and consuming powers of a modernised progressive India mean hereafter? It is significant that since the question of status within the Empire was settled, on the true lines of British freedom, at the Imperial Conference of 1926, the idea of free co-operation, especially in the economic sphere, has made remarkable strides in this country and in the Dominions. Many opinions may be held as to the practicability and desirability of Free Trade within the Empire, but irrespective of party and of fiscal predilections the thought of Imperial economic co-operation finds support and fires the imagination in all quarters. India is still obsessed with doubts as to her status in the Empire, and for this reason has no mind at present to turn her attention to questions of imperial economics. I am not going to be misled into misleading my audience into Indian political and constitutional questions. No one I think will quarrel with me in saying that the difficulties in regard to Indian constitutional progress are formidable. Yet Britain has solved many imperial constitutional questions in the past by loyal adherence to the guiding principles of individual freedom and free institutions. Insistence on these principles provides the best reply to the Bolshevist challenge in India and throughout the East which is further complicating the Indian political position. Bolshevism dangles before India the ideal of self-determination, and glosses over the accompanying economic tyranny. For the moment it may be said, in the words of Dr. Robert Bridges' great poem, "The Testament of Beauty," that

"Wisdom lies
In masterful administration of the unforeseen."

Wise economic action cannot but react favourably on Indian political questions, and I cannot but hope that in due time the idea of Imperial economic co-operation will find as keen support in India as in other parts of the Empire. It is, I submit, an idea which all those who have business connections with India should ponder and foster. They will find, I think, that it will lead to a new and better angle of approach. The economic developments in India since 1900 require a corresponding change of mentality in the business community of this country and among European business men in India. The latter are keenly conscious of the need for clear thinking and a new orientation, though I sometimes feel that they have not taken adequate steps to organise themselves for the purpose. It is a misfortune for India and the Empire that climatic and other conditions make it necessary for Britons in India always to be sojourners, looking forward always to their well-earned visits home and ultimate parting from India. But this need not prevent us, whether here at home or in India, from thinking of the Indian business community as fellow workers in the trade and commerce and industry of an Imperial Economic Unit. The recent admission of Indian merchants to membership of the Baltic Exchange is a most refreshing example of the new spirit for which I plead. There is need for greater co-operation between British and Indian business, and more frequent visits to India by the heads of commercial firms in this country to meet their coadjutors and their customers in India. British business cannot hope to maintain its predominance, already challenged, in Indian markets, unless British business men maintain the close relations on which it has been based by going out to India to study their markets at close quarters and to make personal contacts in the local setting. It may be added that modern conveniences and comforts make a visit to India a delightful and desirable experience.

The extent to which India is already taking her place in Imperial economics is apt to be overlooked. The growth of the steel industry, for example, is of immense strategical importance. So is the all too slow growth of her road system and the use upon it of motor lorries and other mechanically propelled vehicles, a subject in which the Government of India and the Central Legislature and the Provincial Governments have recently co-operated with the valuable result of the setting up of an all-India Road Fund. The figures comparing the relation of India's internal debt to her external debt (Table 8) bring out clearly how much of the capital for internal development is now coming from Indian sources. In 1900 out of a total of 335.74 crores of debt, the debt in England was 200.13 crores, or 59.6%. In 1929 the corresponding figures were, total debt 1,074.16 crores; only 470.05 crores were in England, that is, only 43.7%. Practically the whole increase of over 700 crores in the debt since 1900 is invested in productive assets. India, partly indeed against her own will, is taking an ever-increasing share in financing her own internal development. Recently as the result of political uncertainty capital has been tending to leave India, and in addition, a proof of the loss of her one-time isolation from world finance, the octopus-like absorbing power of the New York Stock Exchange has drawn short-term money away from India. The table (Table 7) which I give of India's Balance of Trade includes figures of Governmental remittance transactions. It is remarkable that, though the balance of trade in India's favour in commodities and precious metals has increased on the average from about forty crores a year to over fifty crores a year, the power of the Government to remit funds to London, remains much where it was. The explanation must be found in capital movements. Either fresh imports of capital into India have diminished, or exports of capital from India have increased, or both factors have combined to cause a reduction of about ten crores a year in the extent to which movements of capital create a demand for rupees in settlement of differences. This phenomenon has of course adversely affected the power of the Indian Government to spend money on capital development unless it can borrow in London and the amount it can borrow in London is again adversely affected by the political situation at the moment. The result has been that the Indian Government has been forced to curtail its capital programme, particularly in the sphere of railway development. Such curtailment was inevitable, but it is certainly unfortunate Few countries in the world offer greater and more certain opportunities for wise capital expenditure on the development of railways, irrigation, hydro-electric power schemes, and the like It has been my fortune to preside for the last six months over the Colonial Development Advisory Committee, which has the duty of advising the Colonial Office and the Treasury how to spend £1,000,000 a year on Colonial Development. I do not feel dissatisfied with what we are doing, but we have had the same experience as others in like circumstances. The difficulty is all the time to find in the Colonial Empire really desirable projects which are ripe for action and economically profitable. In India the difficulty is just the opposite one, to choose among the large number of attractive projects, especially railway projects, all immediately reproductive and offering a return of at least six per cent., the ones which ought to be given preference when the available finance has to be rationed. In India the organisation for preparing the projects up to the stage when they are ripe for action is on the spot and impatient to be employed. There would seem to be something lacking in the sphere of Imperial economic co-operation if this opportunity of benefiting India and using the spare productive capacity of this country should have to continue to be neglected. Similar opportunities await private enterprise in India, but political anxieties seem to have damped down the spirit of the merchant adventurer.

I have dwelt hitherto on the immense economic developments in India since 1900. But for all the greatness of the change, the striking fact remains that India still gives the impression of changelessness. She remains always to outward appearance unrepentantly medieval. In sixty years Japan has jumped from the early middle ages into the twentieth century, straight from the wheel-barrow stage to the electric railway. Japan has boldly thrown in her lot with the West, has set herself frankly and unreservedly to remodel her national life and to copy and adapt all that she can from the West. She has not abated her nationalism in doing so, or rejected her heritage from the past, but she has been willing to go to school with the West. Turkey has recently started almost fanatically to westernise herself. Persia and even Afghanistan are trying to follow along the same road. In Turkey and Japan the only fitting word with which to characterise the change is the word "revolution." In India there has been no revolution. Hinduism continues to use all its weapons of conservatism to fight for its medievalism. More than a hundred years ago Ram Mohan Ray, the founder of the Brahmo Samaj, set before himself the ideal of bringing Europe and Asia together while securing for Asia the retention of her own individuality. It has been said of him that " the aim of his many-sided activities was to set his country free from the weight of medieval abstractions." Later movements, such as the Aryo Samaj, for all their liberalism, have not advanced to the level of Ram Mohan Ray, and have been led in their nationalistic bias to claim that every Western idea and discovery worth having has already been anticipated in the Vedas. In the result even the liberal leaders of Hinduism find themselves driven to fight for medievalism against modernisation. The West has much cause for self-criticism and would not wish to see India lose herself in slavish imitation of Western culture. Uncritical acceptance of the outward forms of representative government and of the cult of nationalism, both of which are exotic in India and have passed their zenith in the West, would injure both India and Europe. Yet surely the ideal of Ram Mohan Ray is the truer one. Medievalism must go. One of the leaders of the renaissance movement in Northern China has expressed the same hope for China when he called for " a rebirth of an old civilisation under the influence of a new impulse and of a new setting brought into being by direct contact with the ideas and methods of the modern world." Japan has not ceased to be intensely Japanese in becoming modern. True economic progress in India will not be fully realisable till India sloughs off its medieval abstractions. It is too soon yet to judge of the ultimate outcome of the policy of actively encouraging economic development begun in Lord Curzon's day. The movies and the motor-car are doing their part without Government aid in breaking into India. The modernisation of Turkey and the ferment in Afghanistan cannot fail to react on the Muhammadans of India. The emancipation and the education of women in these Muhammadan countries must bring about immense changes in Muhammadan India. No province of India has moved forward more strikingly than the Punjab in recent years. The Muhammadans were slow to accept English and Western education and lagged far behind the Hindus. But in the Punjab both Muhammadans and Sikhs seem likely to interpose less obstruction to modernism once they feel its impact than the more rigid Hindus. Both Sikhs and Muhammadans take kindly to mechanics. Interchange of thought between East and West is a common heritage of all the Muhammadans. It comes naturally and easily to peoples whose religious history tells them of the great days when in Cordova and Bagdad and Damascus they were the leaders of intellectual life and carried the torch of learning to benighted Europe. Angora has adopted a secularist standpoint without rejecting Muhammadanism. It may not be so long before Kabul, Peshawar and Lahore follow Angora's lead. It is the step from the religious to the secularist approach to political and economic questions which Hinduism finds it so hard to take. Hinduism as a social system is far more antagonistic to economic progress than was the religious background of medieval Christian Europe. Yet if his Muhammadan fellows in India lead the way, the Hindu can hardly refuse to follow. He is not called on to abjure his religion. He may profoundly modify Western economic thought in adopting and adapting it to his own needs, and if our ideals are open to the charge of being unduly materialistic, such modification will be for our good as well as for his. When Hinduism rejects its medieval abstractions, the economic progress of India will at last deserve to be called revolutionary, and India with her 320,000,000 souls will advance to a standard of living and comfort incredibly higher and happier, in the light of which the present poverty of her masses will be an evil nightmare of the past.

APPENDIX.

TABLE 1.

Population (All India).

1901	294.3 million inhabitants
1911	315.1 „ „
1921	318.9 „ „

TABLE 2.

Area Under Cultivation (British India).

Five year average.	acres.
1900-05	203,600,000.
1922-27	225,250,000.

TABLE 3.

Area Under Irrigation.

Five year average.	acres.
1900-05	32,160,000
1922-27	46,690,000

TABLE 4.

Agricultural Production.

		1900-05 average.	1922-27 average.	Increase %
Rice (cleaned)	tons	21,500,000	30,690,000	42.7
Wheat	„	7,676,000	9,227,000	20
Tea	lbs.	199,792,000	363,738,000	82
Cotton	400 lb. bales	3,212,000	6,254,000	94.7
Jute	„ „ „	7,076,000	8,592,000	21

TABLE 5.

Mineral Production.

		1900	1926
Coal	Million tons	6.1	20.9
Petroleum	„ gallons	37.7	280.0
Manganese	Thousand tons	127.8	1,015.0
Gold	„ ounces	513.0	384.0
Iron ore	„ tons	50.0	1,659.0

TABLE 6.

Railways.

	1900-01	1926-27
Mileage open for traffic	24,752	39,049*
Capital invested (crores)	Rs. 329	Rs. 788
Net earnings (crores)	Rs. 16	Rs. 42.6
Percentage of net earnings on capital outlay	4.99%	5.41%

*Latest figure is in excess of 40,000.

TABLE 7.

Balance of Trade.

(In lakhs of rupees).

	Average 1909-14	Average 1927-28	Average 1928-29
Exports of Indian merchandise (private) ..	+2,19,50	+3,19,15	+3,30,13
Re-exports of Foreign merchandise (private)	+4,62	+9,54	+7,83
Imports of Foreign merchandise (private) ..	—1,45,85	—2,46,73	—2,51,42
Balance of trade in merchandise (private) ..	+78,27	+81,96	+86,54
Balance of Transactions in treasure (private)	—36,07	—32,19	34,36
Total visible balance of trade	+42,20	+49,77	+52,18
Balance of remittances of funds	—42,62	—37,84	—41,39
Total visible balance of accounts	—42	+11,93	+10,79

TABLE 8.

Debt Figures.

(In crores of rupees)

	March 31st, 1900	March 31st, 1929
Total in India	135.61	604.11
Total in England—	200.13 (£133.43 million at 1s. 4d. to the R.)	470.05 (£352.54 million at 1s. 6d. to the R.)
Total interest-bearing obligations ..	335.74	1074.16
Total productive assets	158.16*	872.73

*NOTE.—Owing to differences in the method of showing the statement in the two periods, this figure is only an approximate calculation.

TABLE 9.

Cotton Mill Industry.

	No. of mills	Capital paid up lakhs	Looms	Spindles	Number employed
1900-01	191	15,80.1	40,542	4,942,290	156,355
1926-27	306	45,85.1	158,124	8,412,817	384,082

TABLE 10.

Production and Trade in Cotton Yarn.

Five year average. (1,000 lb.)

	Production	Imports	Exports	Balance retained
1900-05	511,749	33,100	227,883	316,966
1922-27	707,231	52,174	41,462	717,943
1927-28 (year alone) ..	808,911	52,345	24,697	836,559

TABLE 11.

Cotton Piece-Goods.

(in million yards)

	1909-14 average	1926-27 average	1927-28 average
Indian Mill Production—			
Grey and bleached	854	1,577	1,675
Coloured	251	681	681
Total	1,105	2,258	2,356
Imports	2,631	1,787	1,973
Available for consumption and export	3,736	4,045	4,329
Exports of home produce	89	196	167
Re-exports	65	29	34
Total Exports	154	225	201
Balance available for consumption in India	3,582	3,820	4,128

NOTE.—As the production of cotton piece-goods in 1900-05 was stated in lbs. and not in yards, comparative figures are not available.

TABLE 12.

Jute Mill Industry.

	No. of mills	Capital paid up (lakhs)	Looms	Spindles	Number employed	Mill consumption (million bales)
1900	36	4,09	15,340	317,348	111,272	Not available
1913	64	7,65	36,050	744,289	216,288	4.5
1925-26	90	17,40	50,503	1,063,700	331,326	5.4
1926-27	93	17,34	51,061	1,083,816	333,659	5.5

TABLE 13.

Consumption of Rice.

	1900-05 average tons	1922-27 average tons
Production	21,500,000	30,690,000
Export	2,070,000	2,250,000
Balance retained	19,430,000	28,440,000

TABLE 14.

Quantity of Principal Imports.

	1900-01	1927-28
Cotton—		
Raw (1,000 tons)	11	66
Twist and Yarn (1,000,000 lb.)	34	52
Piece-goods (1,000,000 yards)	2,004	1,767
Iron and Steel Goods (1,000 tons)	262	1,197
Sugar (1,000 tons)	263	823
Mineral Oil (1,000,000 gallons)	80	232

TABLE 15.

Quantity of Principal Exports.

	1900-01	1927-28
Cotton—		
Raw (1,000 tons)	178	480
Twist and Yarn (1,000,000 lb.)	118	24
Piece-goods (1,000,000 yards)	69	167
Jute, Raw (1,000 tons)	620	892
Grain, Pulse and Flour (1,000 tons)	1,630	2,784
Tea (1,000,000 lb.)	190	361
Oilseeds (1,000 tons)	549	1,210
Raw Hides and Skins (1,000 tons)	73	64
Metal and Metal Manufactures (1,000 tons)	136	617
Ores (1,000 tons)		760

TABLE 16.

Value of Principal Exports.

	(lakhs of rupees) 1900-01	1927-28
Cotton—		
Raw	10,12	47,72
Piece-goods	1,53	6,80
Twist and Yarn	4,17	1,87
Total	15,82	56,39
Jute—		
Raw	10,86	30,66
Manufactured	7,86	53,66
Total	18,73	84,32
Tea	9,55	32,48

TABLE 17.

Co-operative Societies.

	Number	Capital paid up Rs.
1905-06*	283	31,548
1926-27	89,081	67,93,60,317

*None in 1900.

TABLE 18.

Iron and Steel Production at Jamshedpur.

	1916-17	1921-22	1927-28
Pig-iron	147,497	270,270	644,296
Steel ingots	139,433	182,107	599,563
Finished steel	98,726	125,871	408,343

DISCUSSION

The Chairman said the grateful thanks of the meeting were due to Sir Basil for the paper he had read, which undoubtedly was very stimulative of thought, although there were some aspects on which everybody might not be in complete agreement with him. It was the custom, he understood, to allow members of the audience to take part in the debate, and he would not stand between them and the lecturer for more than a minute or two. One thought had obtruded itself as he had listened to Sir Basil when he dwelt upon the mediaeval abstractions in India in relation to economics. There had passed through his mind the great development during the last ten, fifteen or twenty years, which would appear to show, at any rate, that the mediaevalism was giving way, and that there was room, of which advantage was taken, for great improvement. Although he did not intend to refer in detail to other aspects which suggested themselves to him, and no doubt to many members of the audience, the history of the last twenty or thirty years would seem to indicate that India had been under the influence of an intense modernism rather than of mediaeval abstractions, and that no opportunity had been lost of taking advantage in certain directions of every modern movement. If one thought of what had happened before the war, and since the war, and the varied expansion of thought that had characterised India, no less among Hindus than among Muhammadans and Sikhs, he thought everyone must wonder at the great power of assimilation and imitation that India had shown in so short a time, rather than, if he might suggest it, at the mediaeval abstractions of India. He quite realised the value of Sir Basil Blackett's indication of the difficulties in relation to the economic development of India. India had moved forward very rapidly in the last twenty years, and he could not but hope that in the future agriculture would be more productive. Agriculture was the most important industry in India, as everyone knew. According to the census, 72 per cent. of the population were engaged in it; but he was quite certain that it was no exaggeration to say that some 90 per cent. of the population of India were interested in agriculture. In other industries the development had been rapid, considering all the difficulties Sir Basil had pointed out; indeed, it was very striking if one looked at the changes that had taken place. Jamshedpur, to which reference had been made, was a notable example. He remembered being enormously impressed when he went to see it, and had taken care to inform himself of the conditions before Jamshedpur was started. It was quite marvellous to see there that great city of over 100,000 inhabitants, with its vast steelworks. The industry was at one time confronted with a period of great danger and difficulty as the result of the war and the development consequent upon it. Nevertheless, those great works, of which India had every reason to be proud had developed apace, and Sir Basil had shown what they produced in 1927-1928, and what they were producing to-day. He did not think there was any reason to despair; indeed, he thought from what Sir Basil had shown, there was considerable ground for hope, and even for belief, that in the future, as India continued to develop, she would improve, and would be more prosperous. He turned aside from other considerations which might, perhaps, have some effect, but to which he did not refer at that moment. All he would say was that he believed it was always of advantage that there should be greater co-operation between British and Indian businesses, between both the employers and the employed, and he wished to echo, with all earnestness and sincerity, the hope expressed by Sir Basil that in the future India might be more happy and more contented and more prosperous than in the past.

Sir David T. Chadwick, C.S.I., C.I.E. (Secretary, Imperial Economic Committee), in opening the discussion, said that, as usual, Sir Basil Blackett, when speaking on an economic subject, had interpreted it in a human form, and had introduced many philosophical suggestions. He had done that that evening, but there was one point on the purely economic side to which the Chairman had alluded, and which he desired to mention again. He was very glad that Sir Basil had not confined himself to the statistics of the export and import trade. Trade statistics did not form a proper measure of the economic development of a country. The lecturer had given the figures of production, and had said that India was often looked upon as in a state of arrested economic development. The statistics, in the appendix to Sir Basil's paper, in the last thirty years showed that, although India was an old agricultural country with a settled population—unlike the vast Dominions and many other portions of the earth in which rapid expansion was possible, and in which one was accustomed to see big percentages of increase, percentages frequently based on very small numbers originally—the output of cotton in India had increased by 95 per cent., of tea by 82 per cent., of rice by 40 per cent., of wheat and jute by 20 per cent., and of oil seeds by over 80 per cent.

He had recently had to do with persons representing many portions of the Empire, and also certain foreign countries, in economic matters, and he could imagine any one of those representatives referring with pride to such figures, and rejecting with a certain amount of indignation any suggestion that their country was in a state of arrested economic development. The figures which Sir Basil had given referred to agricultural development. The lecturer and the Chairman had alluded to the industrial development which had gone on side by side with it, and also to the still more significant fact that a great deal of the investment in industry, and also much of the enterprise in starting the new industries was Indian in origin and Indian in execution. These were all signs of definite and varied progress.

The lecturer had also mentioned the great conservatism of Hinduism, and had suggested that a certain inhibition of economic progress was inherent in the social system. The social system, as far as he knew, was designed and operated very greatly to maintain things as they were. It had many virtues. There were no such questions as unemployment benefit in India, or poor law relief. The family looked after their own unemployed and poor. The system was strong. He suggested that there should be no ground for impatience with the economic development of India, because it was not a matter of straightforward development, it was a question of the readjustment of a very old system, and that was a matter of very great difficulty. It was impossible to overestimate the importance of India, he believed, as a member of the British Empire economically. Much remained to be learnt. Closer scientific co-operation between India and other parts of the Empire in matters of agriculture was slowly being developed. There was room and scope for much closer co-operation, not necessarily for fiscal or political measures, but actual co-operation both in scientific inquiry and in economic matters between this country and India.

Sir Campbell Rhodes, C.B.E. (Member of the Council of India), said the speaker had presented so many interesting facets of the economic progress in India that it was very difficult to pick out the underlying thought; but before attempting to do so he desired to refer to one of Sir Basil's *obiter dicta* in connection with his own community. Sir Basil deplored the short time that merchants and industrialists spent in India. He went a long way with Sir Basil, as everyone must who had his happy days in India behind him, but he did not go all the way. He would have gone all the way if Sir Basil had also deplored the short time—not thirty years but five—that distinguished Finance Members spent in that country—thus depriving India of the benefit of their accrued experience. But was it altogether a disadvantage that merchants and industrialists, when their time had come, gave place to the younger men to come after them? He did not think so. They got early responsibility, and they combined those three great business assets, therefore, of responsibility, youth and energy. Perhaps England might there learn something from India.

As regards what he thought had been underlying the remarks of the lecturer, he would like to read one short paragraph from the Report of the Indian Fiscal Commission: "One of the most important results that may be anticipated from a development of industries in India is one that cannot be measured in terms of money. A country industrially undeveloped tends to suffer from a certain intellectual deadness. The outlets for diversity of talent are few. Those who might have shone in a wider sphere have their energies and ambitions cramped in the mould of uniformity. It is hardly too much to say that a certain measure of industrial life and opportunity is an essential condition for building up a vigorous national character; and with regard to India, the effect on the national character is likely to be particularly marked and particularly beneficial. It has long been felt that education in India has not been producing a type of mind with a sufficiently practical grasp of affairs, and industrial training is calculated to provide the corrective required."

Those words were as true to-day as when the Commissioners wrote them in 1922. To give two illustrations:—when the Indian Agricultural Commission was formed, it was found very difficult indeed to find proper, adequate representatives of agriculture. In the Provincial and Central Councils to-day in India it was as difficult to find representatives of agriculture as it was in the English House of Commons—and that was saying a great deal. The other illustration he must touch upon with some delicacy, because it affected a Province of which, for some short transitory period, he had some slight experience. He thought it was true that where in India our Indian fellow-subjects were taking up industry and commerce whole-heartedly there was a greater philanthropic spirit, a greater effort at social service, and there men could be found competent to run a town and a provincial council. Those men were not always to be found in some of the other Provinces, he was afraid.

Many people thought it would suit England very well if India confined itself to supplying raw materials and took English manufactured goods. As a matter of fact, she took more British manufactured goods than Britain bought of her raw materials, a fact that should never be forgotten; but the path of liberality was, he thought, the path of safety, and a prosperous India meant a prosperous England, though it might mean—and that hurt in these difficult times of readjustment and unemployment after the war—very difficult and long-protracted reorganisation of our English industries. He had heard it said that we were far too generous to India when we gave her fiscal autonomy, that we should have adopted the attitude of the United States, the land of the free, towards the Philippines, and of our neighbour France towards her overseas dependencies, and prevented them developing their economic riches at the expense of the mother-country. Personally he thought we were right.

Two things were necessary to develop industry in India properly: experts and capital. He had lately had the opportunity of meeting one or two young Indian men over here studying industry, and if those men at all represented the class of man who was going into industry now in India, then he said all was well with that country. They were a particularly fine type of men, eager not only to learn their work thoroughly, both here and on the Continent, and also in America, but anxious also to learn that much more difficult thing—the management of labour.

In regard to capital, India was always shy of borrowing abroad, because she was getting a little more ready to do the only other alternative, the alternative of bringing out her hoards, whatever those hoards might be. She did not seem to realise that a prosperous country like the Argentine had built up the whole of its prosperity on borrowed capital, and had borrowed not to oblige the lender but because it found that after paying for the service of the loan it could make a good profit for itself. India was far behind in its borrowing, and he could almost wish that the late Finance Member had dug a little deeper into the pockets of the City of London when the running was easy. He had pointed out how the development and extension of the railways in India had had to be stopped—a matter, it must be remembered, that affected industries like the Tata works, because when India decided to nationalise her railways she entirely forgot to provide the money to do it. It was very unfortunate that certain people in India were anxious to damage India's credit in the eyes of the world. They could not really do it. The Old Lady of Threadneedle Street was not a hysterical child, and knew perfectly well that India's debt was invested in reproductive effort to a greater degree than perhaps in any other country in the world. There could be temporary setbacks, such as gave those who believed in India the opportunity of buying industrial and bank shares at far below their intrinsic value; but he would appeal to those who had served and loved India so well, and had retired, not to join that band trying to damage the credit of India, not to join a band with which they made such very strange bedfellows.

He had only one word to say in closing. An Indian magistrate had once told him that in his district it was possible to get anyone to vilify an honest man for four annas. The price was somewhat high. If one wanted that, it could be obtained in London for a penny. The truth would cost twopence!

Mr. David S. Erulkar said he had listened to a most interesting paper, but he must admit that he found himself in disagreement with several of the statements and points made by the author. It was not possible, in the course of discussion in the limited time at one's disposal, to deal with all the points raised in the paper, but he would try to refer very briefly and only generally to some of the main aspects of the very important subject dealt with. His views being different from those which had been expressed by the lecturer, he offered them in a spirit of healthy difference of opinion.

In the first place, Sir Basil had referred to the extraordinary poverty of the masses of India. He had explained that on the ground of the Hindu social system—the doctrine of Karma, as he called it, and the absence of effort for material progress. He was afraid he could not agree with that explanation. The doctrine of Karma enjoined resignation to the inevitable, with a view to sustaining one through sufferings over which human beings had no control; but it in no way implied the absence, or in no way discouraged the presence, of human effort for material progress. He felt one must look elsewhere for the causes of the poverty of the masses of India. One of the reasons, to his mind, was the lack of free and compulsory education. There was no doubt that poverty prevailed; there was no doubt that the bulk of the population continued illiterate. There was nothing in the Hindu social system or in the doctrine of Karma to explain the illiteracy of the people of India. The responsibility for that, he for one must plead, rested with the authorities. With such a state of affairs continuing, and the bulk of the population steeped in illiteracy, progress in every direction, material, social, hygienic, even religious, was seriously impeded. Even religious development was impeded, because illiteracy provided the most fertile ground for the misinterpretation of religious and spiritual ideals.

The second reason for the present economic condition of India was the absence of the national viewpoint in the economic and fiscal policy of the country, in consequence of which it did not serve the economic needs of the country. Sir Basil, in his very illuminating paper, had shown that the trade of the country had increased. No doubt it had increased ; but how had it reflected on the material condition of the people ? During the last few years, particularly during the post-war decade, the industrial production of the world had increased, and the raw products of India had, in the ordinary course of events, come to be exported in larger quantities for the factories of manufacturers abroad. Had that helped the Indians ? The poor agriculturist continued in his abject state of poverty, overburdened with debts, and absolutely helpless against the buyers of his produce. India had afforded one example where the country had shown a large foreign trade with a favourable balance of trade, exclusive, of course, of the invisible exports, and yet the bulk of the population continued in a state of extreme poverty.

Coming to industries, even there the want of a national policy had certainly impeded development. Only about 100 years ago, in spite of the doctrine of Karma, implying, according to Sir Basil, the absence of active effort for material progress, India could claim world superiority in some of her manufactures. India then built the finest and the best ships produced in the world. India's muslin industry and other industries were equally prosperous, but they were now all gone, they were things of the past, allowed to be wiped out. To-day, except for the jute industry, with its peculiar position in regard to the world monopoly of jute that India possessed, there was not one industry in India which felt securely established. The lecturer had referred to the removal of the cotton excise duty in India. Its unjust imposition and continuance for a number of years had so seriously crippled the industry that the mere removal of the imposition at that stage was not going to tide it over the serious crisis with which it was faced, and if the policy of the Government of India was indicated by the rejection of the recommendation made by the Tariff Board for a modest protective duty to protect that industry, he was afraid the present unsatisfactory state of the industry must lead to an irreparable disaster.

Even in the case of iron and steel it was a matter of history that Mr. Jamsetji Tata was faced with an unsympathetic attitude on the part of the Government, reflected, *inter alia*, in their mining and prospecting regulations, which one European writer had described as very cleverly devised to obstruct and prevent development. The protection afforded to that industry had been neutralised by the exchange policy of the Government, aggravated by transport and other facilities which the foreign manufacturers had got with a view to shipping their goods into the Indian markets. The clue to that unsatisfactory situation was afforded in the remark of Sir Basil where he said that particular interests in this country had not infrequently looked askance at the development in India of industries which threatened the exports of the corresponding products of Great Britain. That such interests did enjoy unusual facilities and privileges could not be denied. To take one instance, until about 1922 some of the European companies trading with and controlling the trade of India actually were outside the operation of the Indian income tax, with the result that they traded and made huge profits in India, and yet evaded the income tax of India ! What was wanted was a government policy based on sound national lines which would resist all influences, and would work in the best interests of the country. India had been promised the other day by the Secretary of State in the House of Commons a change in policy when he said, " The idea of the exploitation of India in British interests is a thing of the past." How far that would materialise remained to be seen. The fact remained that the prosperity of India to-day was chimerical, and unfortunately the policy referred to by the Secretary of State was very largely responsible for it.

Mr. George Pilcher (Secretary, Royal Empire Society) said that if he had heard Sir Campbell Rhodes's speech before sending in his name, he probably would not have done so; but after hearing Sir Basil's address on the economic position of India he felt that it was his duty, and the duty of anyone who knew anything at all of India, to say at least a word or two about the present position of the capital railway development there He wanted to draw attention to the fact that with all the progress that was going on in that country, the capital construction of mileage in that country was at the present moment almost stagnant. India had stood still at the figure of 37,000 miles from 1914 to 1924. That was almost inevitable. Then there had been three or four years of large-scale reorganisation which was absolutely necessary in the marshalling yards and elsewhere, and then they had got down to what it was hoped was going to be a very progressive movement in capital construction. The Government itself had held out hopes of a 50,000 mileage by, he thought 1933. They had actually pushed on from 37,000 to 42,000 miles, but it was now announced that nothing more could be done for the time being, that the capital programme was at an end, and that further construction was suspended. It did seem to him that in the present condition of India, knowing how far her social progress, her progress in revenue, in almost every way, was dependent on railway development, it was completely tragic that there should now be a hiatus in that development. He would remind his hearers that as long ago as 1912 the Mackay Report—the Report produced by a Committee presided over by Lord Inchcape—said that India then needed imperatively a mileage of 100,000 miles of railway, and Sir Basil had said something about what those railways did represent in the way of a thoroughly sound investment. He desired to ask Sir Basil whether he was quite certain that the City of London really would not support a forward programme in India if the Indian Government really screwed itself up to asking the City of London for the money, or for some of the money? They had come to the City of London only a week or two previously for £6,000,000 worth of Treasury Bills. A certain rather egregious organ of the Press had published a leading article on that very day saying " Do not put up the money." The City had offered nearly £9,000,000 when £6,000,000 was asked for. He was absolutely confident himself that if Mr. Thomas asked for money for India he would get it. Personally he had written to Mr. Thomas on the subject, and no doubt a good many others had also. They had been told that he could not extend the field of his operations for the time being, at any rate in India. He felt absolutely certain that if the Government of the present day did put to this country the need of India, the absolute safety of an investment of that kind, the indirect effect it must have on India's general economic prosperity, and therefore on the prosperity of this country and, indeed, on the economic recovery of the whole world after the war, there would be a strong public support for the Government, and he believed that a great deal of the money that was wanted would be forthcoming.

He wished to suggest, in regard to those remarkable figures which Sir Basil had given of the growth of the debt, and of the decline in the percentage of that debt held abroad, that surely one of the explanations of that position was that the Government of India had deliberately embarked on a policy of buying out foreign capital in the existing successful railways, such as the Southern Punjab Railway (the latest instance), instead of coming for more foreign capital and pushing ahead with what seemed to him to be the vital programme of railway construction.

There might be some inaccuracies in what he had said; he had not had time, of course, to get at the statistics, and he was speaking from memory. He had put the case which he had put four or five years ago repeatedly in the House of Commons when India's credit was considered to be good, but nothing was then done, and now the excuse was that her credit was relatively bad. No one could really apply the word " bad " to India's credit; he should have said that she stood probably in the first three countries in the entire world so far as her credit position in the world's money markets was concerned. It was from a sense of duty that he had tried to bring that matter home to the large audience present that day, because he did believe that it was a really constructive policy which would both help India and this country, and assist very largely to cement the long-enduring friendship between this country and India to which he, personally, was very strongly attached.

MR. ALFRED WIGGLESWORTH said his excuse for speaking on the interesting subject of the paper was that he wished to call attention to what was being done in India in regard to agriculture. Sir Basil had shown that 72 per cent. of India's wealth was drawn from the soil, and he thought the progress which could be seen all along the line in regard to the research work carried out in the Institute at Pusa and in the various agricultural departments was not sufficiently known in this country. To give one instance. In the case of pedigree jute seed, the export of which had increased so much lately, it was found that last year they were able to sell sufficient to cover an area of about 1,000,000 acres. That had produced a jute of 25 per cent. greater yield than the local seed which was formerly used, showing that in that area 250,000 acres of land had been liberated for the cultivation of food crops, notably rice. Turning to cotton, the great defect of Indian cotton as formerly grown was the shortness of the staple, which prevented it from being woven in Lancashire, and, indeed, its sale was confined very largely to Japan and local use in Bombay. They had now succeeded in almost doubling the length of that staple, with the result that a very much larger proportion of the crop could be spun in this country, and what was exported and used in Bombay spins finer yarns, and gives a better class of cotton material.

As regards sugar, it was found that the research work carried out in Coimbatore in regard to sugar was very notable. There had been an increase in the percentage of sugar in the cane, again releasing a very large area. He could deal with a large number of crops, but without taking up further time he would ask, what was the ultimate result of all this ? He remembered, though he was not very old, when India was suffering periodically from recurrent famine, when there were millions of people dying each year of starvation. That was not more than 25 years ago. He remembered his friend Mr. William Digby being terribly distressed ; he had raised a million for a famine fund. There was no such famine in India to-day ; that had been wiped out, and it had been wiped out very largely by the intelligent direction of the work from the research stations filtering through all the various departments of agriculture throughout India.

That brought him to another important point. Great developments were going on, as Lord Reading knew, in Africa—greater, perhaps, than many people were aware—and India was becoming a great training ground for the research work and the agricultural developments which were going on in equatorial Africa. The conditions were almost identical ; the monsoon rains and similar temperature, with the conditions of labour much on the same lines, and the result of that was that he looked for a very close co-operation between India and Africa in the future in regard not only to the officials who might be drafted from India to Africa, but in various other ways.

That brought him to the statement of Mr. Erulkar in regard to industry. Everyone knew the transition which had taken place from hand industry, such as the manufacture of muslin in Dacca. That was the inevitable trend of the industrial development; but could one bewail the fact that India had started out on a magnificent career of industrial development because those industries, which would have decayed in course of time, had perhaps withered up rather more quickly on account of the work which had been done? The Chairman had said that two-thirds—and he had heard it stated that the proportion was three-quarters—of the shareholders in the jute mills were Indians, and practically all the shareholders in the Bombay cotton concerns were Indian; and the directing ability of Great Britain, her capacity to turn out suitable machinery and to help to organise those industries, was the key to the future success of India and her development.

Mr. M. M. Aslam Khan asked whether Sir Basil Blackett did not think that the prime condition of agricultural progress in India was that the power of the moneylender should be broken. In order to illustrate his question a little further he wished to give very briefly a few statistics. In the Punjab, for instance, the agricultural debt had been computed by authorities at the figure of 90 crores, and the interest paid on this debt was at least three times the land revenue of the Province. The land revenue of the Province was about one-fifth of the total agricultural income of the Province. That meant that three-fifths of the total agricultural income of the Province went annually to the moneylenders of the Province as interest, and as one-fifth was paid in land revenue, the peasants were left with one-fifth only. He anticipated that Sir Basil might make a reference to co-operation as the solution of the problem, but objected that in the Punjab in the ten years ending 1925 the co-operative societies had helped to wipe away a debt of 3½ crores, but in the same period the total debt of the Province had increased by 30 crores; so that in all there was an increase in debt of 26½ crores, and it followed that if immense strides were not taken in regard to co-operation, co-operation simply could not help to solve the problem adequately. He would like to know the views of Sir Basil on those points.

Sir Basil Blackett (in reply), said he believed himself, and he believed that most people believed, that the economic prosperity of England was bound up with the increasing economic prosperity of India. If one were to take the view that England wanted to prevent production in India in order that India might employ English people, he thought that the English social system would deserve many things to be said of it much worse than he had even dared to suggest regarding the Hindu social system. It was true, no doubt, that the increased production of certain articles in India did mean some temporary dislocation of particular industries in this country, and that was one of the penalties one had to pay for progress; but the picture that he saw of an India that was really economically progressive, whose people had risen to a standard even only moderately higher than the very low one they lived on at present, would mean a world in which the employment, both in India and outside, of people engaged in supplying the consumption needs of India would be ten times greater than the employment that was given to-day by those trades that were put out of action.

As regards the question that was asked by the last speaker but one, Mr. Aslam Khan, he would agree with him that the evil of moneylending, and of agricultural indebtedness, was one of the most serious evils in India, and it was one that terribly impeded production. He hoped Mr. Aslam Khan would forgive him if he said that there was something in the social system to which India was accustomed that was partly responsible for the size of that indebtedness, but undoubtedly the great hope of recovery from indebtedness in India must be the co-operative movement on the one hand, and the education of the people on the other.

That brought him to one of the points made by Mr. Erulkar in his very interesting speech. Mr. Erulkar would not expect him to be in agreement with him, he was sure, any more than Mr. Erulkar entirely agreed with him ; but as regards education, it was certainly essential that education should go forward if India was to make that economic revolution of which he had spoken, and was not merely to make progress, such as he thought she had already been making, though she had not been making a revolution in the last generation. That education, of course, had to be paid for, and India was one of the places where one was up against the extraordinary difficulty that in order for the Government to do the work in education, sanitation, and so on, that was essentially and urgently necessary, it must have the funds, and if it was to get the funds it must tax the people, and it could only tax the people when they had got the education and sanitation that were necessary. (Laughter.) There was a vicious circle there from which it was terribly hard to escape. He had not the figures with him, but during the last decade or so he believed that the number of children who were getting elementary education in India had doubled, and the number of girls who were getting education had increased even more than that. He was not sure whether the literary education that was available was quite the right kind of education. In India, undoubtedly, too much attention was paid to the passing of examinations ; and he had heard the same objection raised elsewhere ; but education, education, education, and perhaps sanitation next to it, were the two things upon which he would lay most stress if he were speaking of the future progress of India.

He did not want to argue with Mr. Erulkar in his reading of the situation as regards other matters, but he would ask him to study with a little care the statistics printed with the paper which he had unfortunately not been able to put before the audience, and which he was sure they would not like to have put before them at the present late hour. If Mr. Erulkar would study those statistics he thought he would see reason to believe that the attitude of the Government of India for the past generation had been definitely to think of India first and foremost, and to try and put forward India's economic prosperity, and not to think in the narrow terms of the immediate effect on particular industries in this country ; and that policy had been remarkably successful. He had already given statistics of rice. The production of rice had increased by 90 per cent., and the Indian home consumption had increased by 50 per cent. Cotton gave an indication of the remarkable falling off in British exports to India. This did not mean that there had been a fall in the total consumption of cotton goods in India, but the cotton goods that were consumed in India were now in much larger proportion cotton goods produced in India from Indian cotton ; and it was that sort of result that the Indian Government had been consciously aiming at in its economic policy, on which he had laid stress.

He wished to thank Sir Campbell Rhodes for his very interesting remarks, and also to assure him that he did not suggest that it was only the merchants who came home from India after a more or less short sojourn there. He was merely commenting, perhaps, on the Deity for creating climatic conditions in India under which it was inevitable that all British people who went there had to come back, and that they did not leave their maiden aunts to spend some of their money in India after they had retired from the scene.

Sir David Chadwick said in the unfortunate absence of the Chairman of the Indian Section he had the very pleasing and happy duty of proposing a hearty vote of thanks to the Chairman and to the lecturer.

The vote of thanks having been carried unanimously, the meeting then terminated.

OBITUARY

Sir Frank Warner, K.B.E.—The death of Sir Frank Warner, which took place from pneumonia at his residence at Mottingham, Kent, on January 23rd, is a severe blow to his many friends at the Royal Society of Arts. He was elected a Life Member in 1903. In the following year he read a paper on "The British Silk Industry," for which he received the Society's Silver Medal, and in 1912 he read a sequel to it, "The British Silk Industry: its Development since 1903." He took the chair at various meetings of the Society and frequently spoke in the discussions. In 1917 he was elected a member of the Council, and he continued to serve as an Ordinary Member and as a Vice-President until the time of his death. The most important piece of work which he carried through in connexion with the Society was the establishment of the Annual Competition of Designs. For many years he had been concerned about the position of young designers, who frequently, on leaving the Schools of Art, were thrown on the world without much knowledge of its ways, and often had no alternative but to hawk their work among the manufacturers—a wearisome, time-wasteful and heart-breaking job. On the other hand, many manufacturers in search of young designing talent did not know where to look for it. Sir Frank conceived the idea of inducing manufacturers to offer substantial prizes for designs of which they were in need, and throwing them open in competition to all British subjects. The proposal was warmly welcomed by the Council of the Royal Society of Arts. An Annual Competition was started in 1924, and is now about to be held for the seventh time. From a rather small beginning it has rapidly grown until last year about £2,000 was offered in Travelling Scholarships and Prizes, and 3,669 designs were submitted. Messrs. Warner and Son offered some very substantial prizes, and Sir Frank was delighted with much of the work that was entered for them. A good many young designers have obtained regular employment in consequence of their work being brought to the notice of manufacturers through the competition, and Sir Frank was satisfied that it is now well on the way to supply a permanent link between these two sides of industry.

Born in 1862, Frank Warner, after studying the theory and practice of silk manufacture at Lyons, entered the firm of Warner and Sons, which had been founded by his father. He invented figured velvets, having three heights of pile, which were first produced in 1916 at the firm's works at Braintree, and at once aroused much interest on account of their beauty of design and gorgeous colouring.

A man of boundless public spirit, he devoted a great deal of time and energy to work outside his own business. He served on the Royal Commissions for the Brussels, Rome, and Turin International Exhibitions, was Chairman of the British Section of the Paris Exhibition in 1925, and was one of the chief promotors of the Silk Exhibition held in London in 1912. During and after the War he served on various advisory textile committees, and acted as Foreign Office Expert at the Silk Congress of the Allies in 1916-17. He was Chairman of the Silk Advisory Committee of the Imperial Institute, 1917-20; Vice-Chairman of the Empire Flax-growing Committee, 1918-25; President of the Textile Institute, 1918-1920; and Chairman of the Board of Trade Committee on British Industries Fairs in 1920-21. He was created K.B.E. in 1918, and was an officer of the Legion of Honour. From 1920-27 he was a member of the City Corporation, and he was officially connected with the Victoria and Albert Museum, the British Institute of Industrial Art, and the Textile Industries Committee of the University of Leeds.

Genial, warm-hearted, and lavish in hospitality, Sir Frank was popular with all who had the privilege of working with him, and his shrewd common sense, tact and knowledge of men and things made it easy for him to carry through schemes which to others less happily gifted would have been impossible.

MEETINGS OF THE SOCIETY

Ordinary Meetings

Wednesday evenings, at 8 o'clock (unless otherwise announced).

February 5.—Sir William Clare Lees, O.B.E. (British Economic Mission to South America), " Some Aspects of the Question of Trade with South America." Sir Edward T. F. Crowe, C.M.G., Comptroller General, Department of Overseas Trade, will preside.

February 12.—Holbrook Jackson, Editorial Director of " The Drapers' Organiser," " Colour Determination in the Fashion Trades." The Right Hon. Lord Ebury, D.S.O., M.C., Chairman, Army and Navy Co-operative Society, will preside.

February 19.—William G. Constable, M.A., F.S.A., Assistant Director of the National Gallery, " Italian Art and the Italian Exhibition."

February 26.—Professor F. A. E. Crew, M.D., D.Sc., Ph.D., Director, Animal Breeding Research Department, University of Edinburgh, " Genetical Methods of Live Stock Improvement." Sir Daniel Hall, K.C.B., D.Sc., LL.D, F.R.S., Director, John Innes' Horticultural Institution, will preside.

March 5.—Professor Arthur R. Ling, M.Sc., F.I.C., School of Malting and Brewing, University of Birmingham, " Brewing as a Branch of Science." Sir William Waters Butler, Bt., F.C.S., Past-President of the Institute of Brewing, will preside.

March 12.—Professor G. Elliot Smith, M.D., F.R.S., " The Human Brain." Sir Oliver Lodge, LL.D., D.Sc., F.R.S., will preside.

March 19.—Mrs. Arundell Esdaile, " The Portrait in later Monumental Sculpture." Charles Reed Peers, C.B.E., P.S.A., F.B.A., will preside.

March 26.—Howard Robertson, F.R.I.B.A., Principal of the Architectural Association Schools. " Architecture of To-day and To-morrow."

April 2.—Nathaniel Lloyd, O.B.E., F.S.A., " Building Craftsmanship."

April 30.—

May 7.—S. K. Ratcliffe, " National Parks."

May 14.—H. Granville-Barker, " A National Theatre."

May 28.—Harry Barnard, " The Father of English Pottery : Josiah Wedgwood—Potter, Inventor, and Man of Science." Frank H. Wedgwood will preside.

Indian Section.

Friday afternoons at 4.30 o'clock (unless otherwise announced).

February 7.—G. H. Tipper, M.A., F.G.S., M.I.M.M., late of the Geological Survey of India, " Recent Mineral Development in India." Sir David T. Chadwick, C.S.I., C.I.E., Secretary, Imperial Economic Committee, will preside.

March 4 (Tuesday).—T. M. Ainscough, C.B.E., H.M. Senior Trade Commissioner in India and Ceylon, " British Trade in India."

April 4.—Lieut.-Colonel Sir Wolseley Haig, K.C.I.E., C.S.I., " The Maratha Nation." (Sir George Birdwood Memorial Lecture).

May 9.—David Clouston, C.I.E., M.A., D.Sc., " The Report of the Royal Commission on Indian Agriculture."

Dominions and Colonies Section.

Tuesday afternoons at 4.30 o'clock.

February 25.—Arthur W. Hill, C.M.G., Sc.D., F.R.S., Director, Royal Botanic Gardens, Kew, " Scientific and Industrial Research in the British Empire—a plea for an Empire Scientific Civil Service." Lieut.-Gen. Sir William Furse, K.C.B., D.S.O., Director, Imperial Institute, will preside.

March 25.—O. J. R. Howarth, O.B.E., M.A., Secretary, British Association for the Advancement of Science, " The Work of the British Association in Relation to the Empire."

April 29.—

CANTOR LECTURES.

Monday evenings at 8 o'clock.

ALFRED B. SEARLE, " Recent Improvements in Methods of Brickmaking." Three Lectures. February 17 and 24, March 3.

LECTURE I.—Bricks still the most pleasing of artificial building materials; some reasons for this. Hand-moulded bricks the most beautiful but too costly and too difficult to produce for many modern requirements. Enormous quantities now needed yearly necessitate mechanical methods of production from many kinds of materials.

Modern methods for making bricks of plastic or potentially plastic clays. Plain Bricks. Rustic Bricks.

LECTURE II.—Methods for making bricks of clay, shales, and other slightly plastic materials. The Stiff-plastic Process. The Semi-dry Process. The Tunnel Kiln and its effect on Brickworks Design. Multi-coloured Bricks.

LECTURE III.—Methods of making bricks of non-plastic materials. Sand-lime Bricks. Slag Bricks. Clinker Bricks. Bricks from Colliery Tips. Cement or Concrete Bricks. Silica Firebricks. Magnesite Bricks. Zirconia Bricks. Sillimanite and allied Bricks. Conclusion.

COMMANDER F. G. COOPER, R.D., R.N.R., " Aids to Navigation." Three Lectures. March 24 and 31, April 7.

LECTURE I.—The Mariner's Compass in various forms. The Marine Chronometer. The Pelorus and Bearing Plates. Parallel Rulers and Protractors. The Station Pointer. The Sextant and Quadrant. Dividers. The Range Finder.

LECTURE II.—Sounding Machines and Echo Sounding. W.D. Finder. Submarine Sound Signals. Whistles and Syrens. Barometers and Thermometers. The Baro-Cyclonometer (Algue's). Telescopes and Binoculars.

LECTURE III.—Clear View Screen. Patent Logs. Chernikeeff Log. Navigation in Fog. Leader Cable. Janus System of Signalling. Bell Buoys, etc. Star Charts and Globes. Tide Charts. Nautical Tables and Books. Noctovisor (Professor Baird's).

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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MONDAY, FEBRUARY 3..Architects, Royal Institute of British, 9 Conduit Street, W. 8 p.m. Special and Business General Meetings.

Chemical Industry, Society of, at the Institution of Mechanical Engineers. 8 p.m. Dr. H. Levinstein, "Chemical Disarmament."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Informal Meeting. Discussion on "Maintenance of Telephone Plant," opened by Mr. H. G. S. Peck.

At the Abbey Hall, Plymouth. 3 p.m. Captain P. P. Eckersley, " Broadcasting by Electric Waves." (Faraday Lecture.)

Engineers, Institute of, at the Geographical Hall, St. Mary's Parsonage, Manchester, 7.30 p.m. Mr. W. Sutherland, "Modern Milling and Pulverising Methods."

Engineers, Society of, at Burlington House, W. 6 p.m. Mr. W. M. Becket, Presidential Address.

Royal Institution, 21 Albemarle Street, W. 5 p.m. General Meeting.

University of London, at King's College, Strand, W.C. 5.30 p.m. Maj.-Gen. Sir F. Maurice, " The Campaign of 1915 on the Western Front. Lecture II—The Preparation for the Battle of Loos."

5.30 p.m. Prof. R. W. Seton-Watson, " Outlines of British Foreign Policy (1815-80). Lecture III—The Rapprochement of the Western Powers (1830-41).'

At University College, Gower Street, W.C. 5 p.m Prof. A. V. Hill, " Oxygen and the Recovery Process in Muscle and Nerve." (Lecture III.)

5.30 p.m. Prof. J. W. Mackail, " The Approach to Shakespeare." (Lecture I.)

Victoria Institute, at the Central Hall, Westminster, S.W. 4.30 p.m. The Rev. Dr. W. M. Christie, " Jew and Arab in Palestine."

TUESDAY, FEBRUARY 4..Automobile Engineers, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 7.45 p.m. Prof. B. P. Haigh, " The Relative Safety of Mild and High-Tensile Steel under Alternating and Pulsating Stresses."

Electrical Engineers, Institution of, at the College of Technology, Manchester. 7 p.m. Mr. S. S. A. Watkins, " Talking Films."

At Lamb's Restaurant, Reform Street, Dundee. 7.30 p.m. Informal Meeting. Discussion on " Curious Faults and Experiences."

Metals, Institute of, at the Chamber of Commerce, Birmingham. 7 p.m. Mr. John McNeil, " Nickel Casting Alloys."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. F. W. Aston, " Isotopes." (Lecture III.)

Television Society, at the Engineers' Club, Coventry Street, W. 7 p.m. Informal Discussion on Mr. Newton's paper on "Photographic Problems of Picture Telegraphy." 8 p.m. Mr. G. P. Barnard, "The Photoconductivity of Selenium and various other Substances."

University fo London, at King's College, Strand, W.C. 5 p.m. Dr. S. Wright, "Physiology of Posture and Movement." (Lecture III.)

5.30 p.m. Dr. C. H. Lobban, "Bridges and Bridge-Construction." (Lecture III.)

5.30 p.m. Prof. Sir B. Pares, "Russian History from Peter the Great to 1861. Lecture III—Peter's Successors and Russia."

King's College (at 40 Torrington Square, W.C.). 5.30 p.m. Dr. J. Krzyzanowski, "Two Modern Polish Novelists. Lecture I—The Social Problem in the Novels of Stephen Zeromski."

At University College, Gower Street, W.C. 8.15 p.m. Miss F. J. Davis, "How London Became the Capital of England." (Lecture III.)

Zoological Society, Regent's Park, N.W. 5.30 p.m. Scientific Business Meeting.

Wednesday, February 5..Analysts, Society of Public, at Burlington House, W. 8 p.m. (1) Mr. R. I. Andrew, "The Determination of Minute Amounts of Iodine in Soils and Waters." (2) Messrs. D. W. Kent-Jones and A. J. Amos, "Preliminary Studies in the Bacteriology of Wheat and Flour." (3) Dr. H. J. S. Sand, "The Separation of Metals by 'Internal Electrolysis.'" (4) Miss Ella M. Collin, "The Rapid Determination of Bismuth and Copper in Lead Bullion by Internal Electrolysis" (5) Mr. G. Winthrop Leeper, "Notes on the Thiocyanate Method of Determining Iron. Influence of Different Classes of Phosphates."

Electrical Engineers, Institution of (Wireless Section), at the City and Guilds Engineering College, South Kensington, S.W. 6 p.m. Short Papers on New Developments.

Geological Society, Burlington House, W. 5.30 p.m.

Microscopical Society, 20 Hanover Square, W. 7.30 p.m. Meeting of the Biological Section.

United Service Institution, Whitehall, S.W. 3 p.m. The Right Hon. Sir Halford Mackinder, "Recent Economic Developments in the Dominions and Colonies"

University of London, at King's College, Strand, W.C. 5.15 p.m. Prof. F. J. C. Hearnshaw, "The Social and Political Ideas of some Representative Thinkers of the Revolutionary Era. Lecture IV—Edmund Burke."

5.30 p.m. Prof. H. J. Rose, "Methods of Research in Classical Mythology" (Lecture I.)

King's College (at 40 Torrington Square, W.C.). 5.30 p.m. Mr. N. B. Jopson, "The Early Civilisation and History of the Slavs." (Lecture I.)

At the London School of Economics, Houghton Street, W.C. 5 p.m. Mr. R. J. Thompson, "Economic Research in Agriculture—Its Bearing on the Supply of Food and Raw Materials."

6 p.m. Mr. R. B. Matthews, "Office Machinery. Lecture III—The Ideal Equipment of the Small Office."

At University College, Gower Street, W.C. 3 p.m. Dr. C. Pellizzi, "La Lirica del Paradiso." (Lecture III.)

5 p.m. Dr. R. J. Ludford, "Cytology in Relation to Physiology and Pathology." (Lecture I.)

5.30 p.m. Prof T. Borenius, "The Appreciation of Italian Art in England through the Ages."

5.30 p.m. Dr. J. Haantjes, "English Travellers in Holland during the XVIIIth and early XIXth Centuries." (Lecture I.)

5.30 p.m. Mr. J. H. Helweg, "Northern Mythology." (Lecture III.)

Thursday, February 6..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Mr. J. W. Maccoll, "Modern Aerodynamical Research in Germany."

Auctioneers' and Estate Agents' Institute, 29 Lincoln's Inn Fields, W.C. 7.30 p.m. Mr. H. H. Robinson, "The Sale of Real Estate by Private Treaty."

Chemical Society, Burlington House, W. 8 p.m. (1) Messrs. A. J. Allmand and D. W. G. Style, "The Photolysis of Aqueous Hydrogen Peroxide Solutions. Part I—Experimental Methods." (2) Messrs. A. J. Allmand and D. W. G. Style, "The Photolysis of Aqueous Hydrogen Peroxide Solutions. Part II—Experimental Results." (3) Miss R. V. Henley and Mr. E. E. Turner, "The Scission of Diaryl Ethers and Related Compounds by means of Piperidine. Part III—The Nitration of 2 : 4-dibromo-2′ : 4′-dinitrodiphenyl Ether and of 2 : 4-dibromophenyl p-toluene-sulphonate and Benzoate. The Chlorination and Bromination of m-nitrophenol"

Linnean Society, Burlington House, W. 5 p.m.

Mechanical Engineers, Institution of, at the Royal Technical College, Glasgow. 7.30 p.m. Mr. F. H. Rosencrants, "Some Factors associated with High Pressure and High-Temperature Steam Generation."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. R. L. Smith-Rose, "Radio Direction Finding by Transmission and Reception."

University of London, at King's College, Strand, W.C. 3 p.m. Mr. C. J. Gadd, "The Jews under the Persian Empire."

5.30 p.m. Prof. R. J. S. McDowall, "The Control of the Circulation." (Lecture II.)

5.30 p.m. Prof. H. J. Rose, "Methods of Research in Classical Mythology." (Lecture II.)

At University College, Gower Street, W.C. 5.15 p.m. Prof. J. E. G. de Montmorency, "Momentous Law Suits and Trials in Various Countries from Classical to Modern Times." (Lecture II.)

5.30 p.m. Mr. A. D. Lindsay, "The Relations between Ethics, Economics and Politics." (Lecture II.)

5.30 p.m. Prof. J. W. Mackail, "The Approach to Shakespeare." (Lecture II.)

Victoria and Albert Museum, South Kensington, S.W. 5.30 p.m. Mr. A. P. Oppé, "The Raphael Cartoons."

Friday, February 7..Chemical Industry, Society of (Chemical Engineering Group), at the Chamber of Commerce, Birmingham. 6.30 p.m. Mr. A. G. Lobley, "Electric Furnaces for Heat Treatment."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. (1) Mr. G. F. Shotter, "A New Null Method of Testing Instrument Transformers and its Applications." (2) Messrs. R. S. J. Spilsbury and A. H. M. Arnold, "Some Accessory Apparatus for Precise Measurements of Alternating Current." (3) Dr. A. H. M. Arnold, "Precision Testing of Current Transformers."

Geologists' Association, at University College, Gower Street, W.C. 7.30 p.m. Presidential Address on "The Geological Life-work of Sydney Savory Buckman." Annual General Meeting.

Historical Association, 22 Russell Square, W.C. 5.30 p.m. Dr Rose Graham, "Some Aspects of Monasticism."

At the Bec School, Beechcroft Road, Upper Tooting, S.W. 8 p.m. Dr. J. A. Williamson, "Sir John Hawkins."

Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Mr. G. F. O'Riordan, "Co-operation between Technical Institutions and Industry."

North-East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-upon-Tyne. 6 p.m. Mr. S. S. Cook, "High-Pressure Steam for Marine Work."

Philological Society, at University College, Gower Street, W.C. 8 p.m. Prof. V. G. Childe, "Philology and Archæology."

Royal Institution, 21 Albemarle Street, W. 9 p.m. Dr. Leonard Hill, "Diving."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "Russian Literary Criticism. Lecture IV—The School of Belinsky, Right Wing (1845-80)."

5.30 p.m. Prof. H. J. Rose, "Methods of Research in Classical Mythology." (Lecture III.)

At University College, Gower Street, W.C. 5 p.m. Mr. G. P. Wells, "Comparative Physiology." (Lecture IV.)

5.30 p.m. Prof. E. G. Gardner, "The Historical Background of Italian Art."

Saturday, February 8..L.C.C. Horniman Museum, Forest Hill, S.E. 3.30 p.m. Miss M. A. Murray, "Ancient Egyptian Jewellery."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Rev. G. Cooke, "Tonality and Form."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4029 *FRIDAY, FEBRUARY 7th, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

" *On the whole we have got the sort of towns that the ordinary sort of Councillor approves of.*"

Clough Williams-Ellis.

Max Beerbohm's " Savanarola Brown " is to be staged in aid of the Oxford Preservation Fund. Surely it must be twenty years ago that he wrote " More," a passage from which was quoted in the West Wycombe Appeal booklet, and which is worth repeating here :—

> " ' All men kill the thing they love ' was the keynote of a fine ballad which everyone has read. And, indeed, it does seem that in all love, be it love for animate or inanimate things, there is an ogreish element ; humanity, in its egoism, being unable to appreciate anything, unless it have also power to destroy it. The comparative indifference with which the ancients regarded landscape might be traced to their lack of tools for its destruction. We, in this century, suffer from no such lack, and our love of landscape is quite unbounded. We have water-towers wherewith to cap our little hills, railway-trains to send along the ridges of our valleys, coal-shafts to sink through ground, where, for many centuries, forests have been growing. We have factories, too, for the marges of wide rivers, texts about pills and soaps for the enamelling of meads, and telegraph-wires for the threading of air, and tall, black chimneys for all horizons. Month in, month out, with tears blinding our eyes, we raise tombs of brick and mortar for the decent burial of any scenery that may still be lying exposed. A little while, and English landscape will have become the theme of antiquaries, and we shall be listening to learned lectures on scenology and gaping at dried specimens of the trees, grasses, and curious flowers that were once quite common in our Counties."

Is this prophecy to be fulfilled ?

By the way, by the sale of only three copies of the 12 autographed booklets, all the cost of publication has been paid for. The sale of the remaining seven should add a substantial amount to the restoration fund.

Lincoln Dr. Fry, the aged Dean of Lincoln, has had to return from America through illness. "I should like, before I die, to see Lincoln Cathedral cleared of debt. We want £20,000 more. £35,000 has been received already from American sources." Surely the East Midlands should find no difficulty in finding so comparatively small a sum for the safety of such a possession. The great business houses of Nottingham, Lincoln and Derby could easily raise such a sum and relieve the Dean's anxiety, and, we hope, prolong his life. The Americans would regard such possessions as business assets to a district, and Lincoln and its choir are unique. Will the Imperial Tobacco Company consider the matter ? The American visitors to Lincoln seem to have done their share here. Durham Castle, on an even grander site, is still in danger.

Cambridge. -What is the Preservation Society doing about the old houses in Sydney Street ? Are they irrevocably condemned ? We observe that a building next to Woolworth's is in progress of demolition. By the way, does not everyone in Cambridge now know their way to Woolworth's blindfold ? Messrs. Woolworth might, therefore, give themselves an excellent advertisement, and paint their fascia a colour which is not so horribly discordant in relation to the hot red brick above. Advertising need not make one's eyes quite so sore.

Sir Lawrence Weaver. The many friends and admirers of Sir Lawrence Weaver feel that some permanent memorial of his work should exist, and a Committee is being formed to consider how best to keep alive the recollection of his constructive work, particularly in raising the standard of the industrial arts. He threw himself ungrudgingly into so many departments of the practical arts of life. His Ashtead Pottery, founded to employ ex-service men, was a great strain and anxiety to him, and his friends are anxious to do all in their power to continue his work here.

The National Institute of Agricultural Botany at Cambridge was the result of his organizing powers when at the Board of Agriculture, and the English farmers have yet to learn the full value of this Institution. The carefully grouped limes around the buildings, and the long avenue running down the side road, and pleasantly leading up to the cottages, were planted as the building went up. If all housing schemes would consider planting as part of the expense of any building proposals new estates would be much less offensive.

Trafalgar Square.—Many Fellows of the Royal Society of Arts must approach the Society's building by way of Trafalgar Square by night. May we suggest that the National Gallery or, indeed, the Nelson column, would be an even more conspicuously startling position than the Grand Hotel, to call attention to Bovril, Crosse & Blackwell's jams, Schweppe's, or "your penny can buy the *Daily Mail.*" Have the Westminster Authorities no power to stop such irritating displays ? Is this educated advertising ?

West Wycombe.—The work here is proceeding in earnest. The Guest House, the official centre of the Society's activities, is progressing very fast. The electric light cables are being laid, and it will not be many weeks before the drainage is in hand. Satisfactory arrangements are being made with Mr. Abbott for a renewal of his lease of the Chair Factory, and negotiations are proceeding with regard to the Hotel and Inns. Mr. Fothergill, the well-known creator of the inn at Thame (noted for the excellence of its food, wine and gardens), had a look at the inns with a member of the Council. He expressed the very definite opinion that if the principal inn were re-conditioned, and really sound English food and drink supplied, it could not fail to be a success. Its position on the main road to Oxford would ensure this. The success of the inn would entirely depend on getting the right man to run it. The remaining two years lease have been taken over from Messrs. Wheeler of Marlow, by Messrs. Ashby of Staines, who realise that if they are to get an extension of their lease they must give some definite assurance that the public will have in West Wycombe a place where they can be assured of wholesome hospitality. Further information as to this will be forthcoming shortly. We suggest that the Royal Automobile Club and Automobile Association should remove their signs from a great many inns until the owners re-condition these and provide decent, wholesome food.

The craze for lounges and five badly-cooked courses simply makes motorists carry their own food, rather than stop at an Inn where they know they cannot even get a piece of decent English cheese or a slice of home-made bread and butter.

Dorchester House.—The old house has gone and there is considerable curiosity as to what sort of building is to take its place. We understand that an Engineer is in command. Sir George Holford, who commissioned Mr. Lewis Vulliamy to design the house now destroyed, was the patron also of Alfred Stevens, the great Sculptor of the Wellington Memorial. The Lecture by Mr. D. S. Maccoll on his work should attract great interest on the 19th.

The Italian Exhibition.—We understand that we owe the idea of this great Exhibition to Sir Austen and Lady Chamberlain's good offices. Lady Chamberlain has been untiring in her efforts in connection with the organization of the Exhibition, and has consented to take the Chair at a Lecture by Mr. W. G. Constable, Deputy Keeper of the National Gallery, on February 26th.

Poole Harbour.—The following letter appears in *The Times*:—

POOLE HARBOUR

To the Editor of *The Times*

SIR,—May I venture to join in the protest so admirably and forcibly voiced by Dr. Farnell against the proposed bridge across the mouth of Poole Harbour? One of the main attractions of this beautiful and unique seaside resort is the joy of walks through the wild and unspoilt tracts of country on the Studland side of the Harbour, which can easily and enjoyably be reached in boats. This is a purely commercial undertaking, is opposed by the Poole Borough Council and also by the Dorset County Council, and if Parliamentary sanction be conceded and the bridge erected this beauty spot will be spoilt for the public for ever. The residents here are practically unanimous in their opposition to the scheme, and many are already planning to leave the locality should the Bill pass through Parliament

Your obedient servant,
REGINALD CRAIGIE.

Sandbanks, Jan. 31st

There surely should be no question of any further disturbance of the exquisite beauty of this part of England.

Carlini. Among the foundation members of the Royal Academy there is no obscurer figure than Agostino Carlini, R.A. A Genoese by birth, he came to England in the early years of George II, and somehow got into touch with Dr. Ward, the generous quack whom Pope satirised, and the inventor of one of the most poisonous remedies of the century. But he believed in it; he had days for seeing the poor without a fee; and he took a fancy to his assistant which resulted in the oddest example of a patron's generosity on record. He sat to Carlini, and ordered him not to finish the statue but to keep it in his studio, as it would bring him custom, promising an annuity for every year that it remained there. Carlini was, of course, in no hurry to remove it; custom came, though slowly. George III sat to him for the magnificent bust in the vestibule of the Royal Academy, and though the model for an equestrian statue of the King, also preserved at Burlington House, came to nothing, Carlini was appointed a foundation member of the Academy, and in due course Keeper also. His alternatives of disreputable dress and Academic splendour are vividly described by J. T. Smith, but he seems to have been popular with the students, though none too good at keeping order, and it is a notable fact that the ill-natured author, Pasquin, has only good to say of him. His masterpiece is assuredly the exquisite monument of Lord and Lady Milton at Milton Abbey, with the husband (*pace* the author of *Highways and Byeways in Dorsetshire*), gazing at the dead wife at his side with the saddest face our sculptors can show. It is hard to say which is better, the delicate little figure recumbent as the mediaeval figure is recumbent, stark dead, or the brokenhearted husband in his robes, whose eyes are bent on her; but both are among the noblest of their kind.

All Carlini's work—and there is far too little of it—is fine, nobly modelled and carved and wholly unaffected. Next in quality to the Milton monument we must place the statue of Dr. Ward, bequeathed by that worthy to the Society at his death and still, happily, in their possession. His dying wishes were not all destined to be thus fulfilled ; that modest desire in his will to be buried under the high altar in Westminster Abbey, for instance, did not commend itself to the authorities, but we may well be grateful to him for his wish that the Society should have his friend's portrait of him, one of the finest portrait statues ever executed in England, and for his generous conduct to the sculptor who, but for his timely aid, might never have achieved a celebrity now too much forgotten.

KATHARINE B. ESDAILE.

A Man in the Street.

The layman is always inclined to have an exaggerated respect for the professional man, the so-called " expert " ; but there is one field of activity in which it is very difficult indeed for him to retain this natural respect to-day. Many are too preoccupied with private business to use their eyes, or even to lift up their heads and look around them as they walk the streets of London or any other English town, and this is the salvation of the average architect, whose sins of omission and commission consequently escape notice. But the ordinary man who does use his eyes is very speedily shocked and disgusted by what he sees.

Even the others, those who do not observe what is wrong, are sub-consciously affected by the dismal lack of beauty and simplicity and dignity in their surroundings. They, too, are aware of discomfort, of depression, but they do not perceive the cause of it. We other laymen who have learnt to observe our surroundings in greater detail, however, are not at any loss as to the cause of our gloom, the failure of our architects is too blatant.

We see everywhere new buildings being erected without regard to site, or to environment, present or future. Higgledy-piggledy in isolated patches, in a jumble of styles, in a haphazard conglomeration of parts, London and every other big town in England is being rebuilt without co-ordination and without plan. A few of the more enterprising breweries are improving their public houses according to a definite scheme, but even their work is often half-hearted, lacking in boldness, enterprise and foresight. The average business man, like the average architect, is incapable of looking more than five years ahead, but to-day, when the average speed of life in all its departments is ten times what it was fifty years ago, really to look five years ahead is now equivalent to what used to be looking fifty years ahead, and it is not astonishing, therefore, that many buildings are out of date as soon as they are erected.

But I do not blame the business men exclusively, or even chiefly. The best of them know that they are ignorant of the arts and they are prepared—much too readily prepared as things are—to accept the advice of the expert. It is the expert who is to blame. Recently I was lunching with one of the directors of one of the biggest industrial enterprises in England. I began by criticising the buildings in which this business is housed. I said that they were without exception monstrously ugly, and that such ugliness was a social evil and had an injurious effect upon all human beings who came in contact with it. He then informed me that for a recent very large building to be erected the firm had made a special effort to get a good architect, and had received plans from a man of reputation well known in his profession, but that another man of no artistic pretensions had given them over 300 more rooms of equal size on the same site.

My host seemed to be under the illusion that the artistic side of architecture is opposed to the functional side and to believe—as so many dilettantes and so-called " artistic " people believe—that art is a matter of superfluous frills and decorations. I tried to convince him that every good architect knew that good architecture sprang from a correct and economical expression of function and that, for example, a hotel could not be a good hotel—architecturally speaking—unless it was good as a hotel. In domestic architecture this is slowly becoming a commonplace, largely through the feminist movement and the emancipation of women. How often have I heard women cursing architects! In ninety per cent. of the flats and houses of England a daily curse upon the head of the architects who built them rises from the hearts of the unfortunate women who have to live and organise their lives in these dwellings.

These are all platitudes, as every well-educated person knows, but, in spite of this fact, the Institutes turn out annually a crop of so-called architects who in their work show not the slightest sign of ever having heard of these platitudes. Still they go on drawing pretty little designs on paper, drawings that look delightful when coloured and hung up upon the wall of an art gallery. They are so " artistic," these ridiculous and futile drawings, but they reveal the sad fact that the man who made them has not the faintest notion of what architecture is and never will have. Yet these are the men to whom the business man, the reputed Philistine, in his ignorance is sent. He looks upon them as artists, as experts in the profession of architecture and almost every time they let him down badly.

As for expecting such architects to plan streets and squares and residential or business districts *as a whole* that is utterly beyond them. It is as much as they can do to put up one building without regarding whether it quarrels with its neighbours, or offends the landscape. As I walk through the streets of London and see one monstrosity after another from the Turco-European and Asiatico-American cinemas and theatres, I wonder how much longer Englishmen will suffer this once beautiful (and in parts still beautiful) city to be degraded and defaced by a completely uncontrolled, irrelevant and spasmodic eruption of so-called " architecture."

W. J TURNER.

NOTICES

NEXT WEEK

WEDNESDAY, FEBRUARY 12th, at 8 p.m. (Ordinary Meeting.) HOLBROOK JACKSON, Editorial Director of *The Drapers' Organiser*, " Colour Determination in the Fashion Trades."

DOMINIONS AND COLONIES SECTION

TUESDAY, JANUARY 28th, 1930. THE RIGHT HON. W. G. A. ORMSBY-GORE, P.C., M.P., in the Chair. A paper entitled " Settlers' Problems in Kenya " was read by SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S. The paper and discussion will be published in the *Journal* on February 14th.

TENTH ORDINARY MEETING

Wednesday, January 29th, 1930. The Right Hon. Viscount Chelmsford, G.C.S.I., G.C.M.G., G.C.I.E., G.B.E., in the Chair. The Trueman Wood Lecture was delivered by Sir Thomas Holland, K.C.S.I., K.C.I.E., D.Sc., LL.D., F.R.S., his subject being "The International Movement of Mineral Products during Peace and War." The lecture will be published in the *Journal* at an early date.

CANTOR LECTURES

Monday, February 3rd, 1930. Dr. E. F. Armstrong, D.Sc., LL.D., Ph.D., F.R.S., in the Chair. Mr. Harold Wright delivered the last of his course of three lectures entitled "Three Master Etchers: Rembrandt, Méryon, Whistler." On the motion of the Chairman a vote of thanks was accorded to the lecturer for his interesting and instructive course. The lectures will be published in the *Journal* during the summer recess.

PROCEEDINGS OF THE SOCIETY

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NINTH ORDINARY MEETING

Wednesday, January 22nd, 1930, at 8 p.m.

Sir Richard A. S. Redmayne, K.C.B., M.Sc., M.Inst.C.E., in the Chair

The Chairman, in introducing the lecturer, said it was about twelve years since the Imperial Mineral Resources Bureau was established by the Government. He had the honour of being the British representative and Chairman Governor of that body. At one of the earliest meetings the Governors had had to envisage the nature of their work, and amongst other things they considered it desirable to investigate the mining laws of the British Empire and, secondly, of foreign countries—to gather them together and explain them in a series of brochures. Mr. Gilbert Stone, who was the lecturer on the present occasion, had been selected as the best possible man to act as the head of that section of the work. That choice had been more than justified by the excellence of the work Mr. Stone had produced, and he wished to take that opportunity of paying a public tribute to his self-sacrificing and arduous work. He supposed there was hardly anybody in the United Kingdom who had acquired such a breadth of knowledge relating to the mining laws of the Empire as the lecturer, and besides that he had the facility of expressing himself in the most delightful English.

Mr. Gilbert Stone, before reading his paper, said he feared its subject was a dull one. He was speaking to a small but important audience, but in the writing of the paper he had had in mind the very much larger audience which the *Journal* of the Society reached. It was because of that larger audience that the paper took the form it did. Most of those present that evening were probably experts, either as lawyers or as mining engineers, but he particularly wanted his observations to reach the ears of another class—the administrators of our overseas colonies, and those entrusted by them with the framing of mining law. He had adopted a rather dogmatic attitude, and had perhaps expressed himself rather more definitely on some subjects than he should.

The following paper was then read: –

OBSERVATIONS ON THE MINING LAWS OF THE BRITISH EMPIRE

By Gilbert Stone, Barrister-at-Law

The request to prepare this paper for the Royal Society of Arts was accompanied by an intimation that it might with advantage be in a form that would enable it to form a continuation of a paper that will be found in the April, 1927 Bulletin of the Institute of Mining and Metallurgy. I shall accordingly not touch upon any part of the ground there covered, except in so far as may be necessary, and shall assume that the points there taken are in mind. As many may not have at hand a copy of the Bulletin in question, I summarise the points there made relevant to the present paper as follows :—

(1) The provisions of a law can seriously affect and can help or hinder mineral development.

(2) The present time, when large areas of Crown land are unoccupied or but sparsely populated, is a convenient time to press on with mineral exploration and prospecting.

(3) The mining laws of the Empire are all different from the mining law in force in this country and may be grouped in six different categories.

(4) This diversity, and differences of a more detailed nature, is illogical unless the circumstances operating are different, because laws which desire the same ends and pursue entirely different courses cannot all be the best practicable.

(5) Whatever the law the cardinal fact remains that mineral development is dependent upon the discovery of minerals, and discovery is made either by the pioneer prospector or by the highly qualified prospector employed by some company with means. Both classes should, in the normal case, be enabled to work and both should be encouraged.

(6) Prospecting alone is useless unless it develops into mining. Mining is an industry essentially hazardous and in many cases calls for large capital expenditure. It is desirable that risks due to uncertainty of title, or continuity of title, should not be super-imposed on the risks inherent to the nature of the enterprise.

(7) Crown rents and royalties should be made equal in different territories so far as may be possible.

(8) Uncertainties as to in whom reside the mineral rights, whether as regards royal metals or otherwise, should, where necessary, be removed by legislation.

Before I proceed to develop the subject by expanding some of the above points, and adding others to them, I think it might be useful to advert to a few facts which are really obvious, but are sometimes not sufficiently borne in mind.

All wealth is derived ultimately from the earth ; but the earth gives of its riches in two ways. It yields temporary wealth permanently as the seasons move from seed time to harvest. It yields comparatively permanent wealth once and for all by surrendering to the miner the minerals that he takes and carries away. The wealth that comes from the surface is ever recurring. The things thus obtained are eaten or worn out, and the wealth is gone. Follies of user do not destroy the source of the wealth. Bad farming there may be, and poor soil may result, but broadly speaking the earth can recover from these errors. The wealth that comes from her mines comes but once. Follies of user destroy the source. Once lost, these riches cannot be replaced

The Romans had a quaint conceit that substantially affected their law, and through their Code the laws of those countries which to-day derive their systems from that of Rome, to the effect that many minerals grow and replenish themselves ; that a mine, if left long enough, would be found stored once again with the metals removed from it.[1]

As a matter of curiosity in comparative law, it may be observed that in earlier times a claim to tithe in respect of minerals was made as of customary right in respect of certain districts in Derbyshire, the claim being subsequently defended on the ground that metallic ores were in a constant state of growth and increase.[2]

To-day, however, although one would think upon reading some prospectuses that the capacity of metallic ores to increase and multiply did exist, it is known that all minerals are things *non renascentia*. Once taken they never recur. Further, mines or wells may be so worked that though vast quantities of minerals are left in the earth, they are in truth lost, having been dissipated in a fashion which renders their future getting impracticable.

Again, mineral wealth is unlike the wealth that comes from the surface in that it belongs not to the earth generally, but to the locality in which it is found. Rubber seeds can be transported from the Amazon and may create a living industry in Malaya. It is otherwise with minerals. One can, of course, treat, refine and use the products of mining in countries other than that in which the mineral is found, but one cannot give to one country the mineral wealth of another ; one cannot, save by storing the gotten mineral, increase or make good a country's deficiency in mineral. Minerals are a gift of nature, once made and never repeated.

Industrial prosperity, and even the successful waging of war, offensive or defensive, is founded upon the capacity to control mineral resources and the ability to obtain supplies, in adequate quantity, of all minerals. It thus becomes apparent that it is the duty of Government to take some care of the wealth that is, but may cease to be; it is the duty of those charged with the Government of our great Empire to see that mineral resources are so developed and rendered so available that without waste we have plenty; and plenty, not of this or of that, but, of all minerals that modern industry and modern defence require.

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[1] See per Wessels J , in Master v African Mines Corporation Limited [1909] T. S. 925 at p 930, 931

[2] See Tapping's Derbyshire Mining Customs (1854 edition) p. 36.

I have made the above observations by way of digression from the main theme because I believe profoundly in the possibility of our Empire becoming far more consolidated, far more closely knit together, than it is to-day, and I desire very earnestly to see that great consolidated Empire have within its confines all the natural resources that modern man requires. It must never be forgotten that the relative powers of nations depend upon their mines. But we must not assume that the strength of England will decline with the mines of England—already, I fear, past the first flush of youth. England may join up with her great overseas possessions and participate in the discovery, development, and exploitation of the natural wealth that is theirs through the financial and technical wealth that is hers; thus instead of decline we may, assuming that certain broad principles are tenaciously adhered to, look forward to an advance in prosperity and strength.

Let me now leave this digression, and turning back on my path resume a consideration of some of the principles which should be borne in mind, in my opinion, when framing laws relating to mineral development. It will be observed in what follows that I am not concerned with that large mass of law which relates to safety and health, workers' liens and compensation, rescue work and the like. This part of law belongs to sociology and is not part of mining law strictly so called. Mining law consists of those provisions under which through a system of licences, leases, and other grants all the various rights necessary in order to prospect for, mine, work, treat, and transport minerals are created, granted, transferred, withdrawn or registered together with those provisions relating to fees, rents and royalties whereby the State obtains recompense for the mineral wealth which the activity of the miner removes. On the last point it should not be overlooked that the chief gain to the State is not to be found in the fees, rents, or royalties obtained, but by the work done, the development effected, the industries created, the labour employed, and the money circulated.

It will be understood that throughout this paper I am concerned with the provisions of mining laws that relate to the prospecting and mining of minerals in Crown land or belonging to the Crown or under a system of law where the Crown controls mineral developments.

It is usually found that a substantial part of mining codes is occupied by provisions relating to disputes. These I am not here concerned with. Other parts relate to various forms of assistance and encouragement which it is becoming more and more the practice for states to offer to the prospector and miner. Provisions of this nature flow directly from some of the principles hereafter enunciated.

When considering the nature which mining law in the above restricted sense should have, I think it may be helpful if I indicate those broad propositions (some of which when stated will doubtless appear so obvious as not to be worth stating) which ten years spent in the critical examination of mining laws existing or proposed, an examination extending over the whole range of Empire mining law and a perusal, I believe, of all the relevant reported decisions (amounting to many thousands) of all the Courts in our Empire has persuaded me should be borne in mind. After each proposition is stated, I develop it to some small extent in order to adumbrate certain lines of thought that each proposition suggests.

1st Proposition: *Mineral development is dependent upon discovery, which is dependent upon the prospector who should accordingly be encouraged.*

Discovery, apart from chance findings, results from prospecting which is done either by the individual prospector or by large scale enterprise conducting what may approach to a geological survey.

The law may check prospecting either by shutting out persons or areas from prospecting. Certain areas must be preserved, but, in considering such matters it should not be assumed that subsidence occurs vertically, or that laws originated to deal with the mining of beds of coal are necessarily applicable. Closed areas should be capable of being prospected subject to the consent of the appropriate authority. Certain persons, e.g., the pioneer prospector generally, may have to be shut out of certain territories, but this should be regarded as a regrettable necessity, that is, as a thing not to be provided for unless necessary. In no case should racial distinctions be made. The foreigner should be welcomed equally with the British subject. The prospector gives far more than he takes away. The foreigner who is willing to assist in the discovery of natural resources is adding to, and not subtracting from, the national wealth. National control over mineral resources can be obtained at a much later stage of mineral development, if necessary, for national defence or otherwise.

Though the law may reasonably shut out areas or persons from prospecting for good cause, it should never do so unnecessarily or by mistake, or by a faulty conception of the nature of prospecting and consequential development. Some laws do, however, unintentionally shut out, or at least, impede some classes of prospectors by requiring so many trivial payments, by imposing so many small regulations, by rendering difficult the transition from discovery to development, by offering too poor a title or too small an area so that the prospector will not undertake his hazardous occupation under such a law.

Other laws do not sufficiently provide for large scale prospecting operations. It should be possible for the appropriate authority to grant very large areas for a period of years taking as their substantial consideration for the grant the expenditure of large annual sums in prospecting work. The purpose of such a grant is to obtain what is in effect a geological survey of the country. It is accordingly essential that the information obtained should be communicated to the Government. It, in turn, follows that the grantee must be given the indefeasible right, conditional upon his carrying out his prospecting obligations, to locate such areas (of large size) as he may choose, within a maximum as regards total areas. The location so obtained should be held on a sure and lengthy title. It should be borne in mind that a prospecting organisation which undertakes heavy capital liabilities of an extremely speculative nature in a country whose geology is little known, or unknown, must be treated more favourably than subsequent exploiters of the known. Such pioneers can bring enormous benefit to a new country and should be attracted, if possible.

A good mining law should, indeed, go far beyond the negative quality of not imposing obstacles. It should actively encourage. This can be, and has in different parts of the Empire been effected by a variety of mineral development Acts. These laws, broadly speaking, provide assistance along the following lines :—

(1) By providing geological information and making available all records showing what has been done, where, and with what results.
(2) By providing prospecting appliances which can be hired on terms involving only a trivial capital payment.
(3) By providing assaying assistance so that the prospector can find out with some precision the nature of the mineral he has discovered.[3]
(4) Bounties (a matter, however, that rather relates to the encouragement of mining than prospecting) and loans.
(5) Discoverer's rewards which may take the form of money rewards or the granting of special claims, or the preferent right to claims, or the vesting in the discoverer of a right to mining titles if he by himself, or his nominee, applies for such rights.
(6) By providing transport facilities.

The maximum mineral development will occur, other things being equal, where all forms of prospecting are encouraged.

2nd Proposition: *The rights of the prospector should be adequate for efficient prospecting and should be capable of being turned by him on discovery as of right into the rights of the miner, which rights should be adequate for efficient mining.*

Prospecting *per se* is of very little benefit. The country in which it occurs only benefits when prospecting leads to discovery and discovery is properly exploited.

A discovery of mineral that never reaches the producing stage brings wealth to nobody. It follows that the law should introduce no obstacles that will hinder the exploitation, in an efficient manner, of discoveries.

Unintentionally, such obstacles may easily creep into a system. Let it be assumed that a particular code is very generous as to the rights which its prospecting licences confer upon the holder. Let us assume a discovery. Let us assume that upon discovery the only right the discoverer has is to mark out and mine a small claim, for a short period, and without the power to amalgamate. Under such a system mining will not flourish, or, if it succeeds in doing so, will live in spite of the law. The reason such a system opposes mining development is

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3. The importance of such facilities can be gathered by a perusal of the account of the discovery of the phosphate deposits in Nauru or (Pleasant) Island contained in Mr. Harold B. Pope's article printed in the Journal of the Department of Agriculture of Victoria Vol. XIX August 1921, Part 8.

because it offends against this proposition. It is true that areas should shrink as one gets nearer to production, but it is equally important that producing areas should be given an indefinite power to expand.

It is possible that this last sentence calls for explanation. The normal mining law envisages three possible steps :—(1) Non-exclusive prospecting, (2) exclusive prospecting, (3) mining. Clearly the area of (1) may, with advantage, be very large while the area of (2) should, if blanketing is to be avoided, be smaller, and, as a rule, the area of (3) should be smaller still for this reason, that the aim in all cases should be to encourage efficient prospecting and mining. Now clearly the granting of a large non-exclusive prospecting area does no injury to efficient prospecting for if one licence-holder chooses not to prospect he does not thereby prevent the prospecting of the area because his licence is non-exclusive. When, however, one comes to the area to be granted to the holder of an exclusive prospecting licence, different considerations arise, viz :

(1) The area should be large enough to allow of sub-divisions into parts, each of which is large enough to form a mining unit.

(2) The area should not be so large as to be incapable of being efficiently prospected by the holder within the term of the licence.

(3) The area should be as large as possible consistent with (2) and the law should encourage large, rather than small, areas, and general, rather than particular, prospecting.

Finally, the mining area, which is the unit to which all the provisions of the mining law should lead, must be of a size sufficient to enable capital expenditure reasonably necessary for efficient mining to be undertaken with a reasonable expectation of an adequate return upon the money laid out.

3rd Proposition. *The rights of the miner must be such as to attract capital adequate for efficient exploitation.*

It should be realised that the prospector and the miner exercise as different functions as the inventor and the manufacturer. It is only in very special circumstances that it is desirable for your mining industry to be carried on by prospectors who have become miners. Such a system may work in the case of easily worked ground in which precious metals or stones are being sought. Even in such cases however, the tendency is for mining to develop into large scale enterprise carried on by companies having large capital resources. The law, accordingly, while rendering it possible for the prospector to become miner, should have in view, as the end to be aimed at, the development of the prospector's discoveries by means of large scale undertakings.

If only large scale undertakings are provided for, and the prospector is shut out from mining, then clearly prospecting is discouraged. If, on the other hand, only small scale mining is provided for, the most efficient mining is prevented. The aim, accordingly, should be to combine both.

The prospector-miner is made possible by providing for grants of small claims for short terms ; the mining company, on the other hand, requires large areas for long terms. The former should be capable of being built up into the latter either by way of amalgamation with a subsequent exchange of a number of amalgamated claims of short term for a lease of long term or otherwise. If no provision is made for building the bridge which sooner or later will be required in order to lead from the activities of the small man to the activities of the capitalists serious difficulties will be met with.

A confusion between the purpose of the claim and the lease has before now caused provisions to be inserted in mining laws that greatly retarded mineral development. In cases of mining such as coal mining, involving the sinking of shafts to a great depth, and a probable capital expenditure in the neighbourhood of £1,000,000, it is useless to make provision for the location or leasing of comparatively small areas such as 100 acres. It is only necessary to bear in mind that, granted a seam two or three yards thick throughout the entire area leased, and assuming no difficulties of transport, abundant wood, cheap labour, and a ready market, it would still not pay capital to sink shafts of any depth in order to work 100 acres of coal. One square mile should be regarded as a more reasonable unit of area where coal mining is concerned, and the larger the area the better, granted sufficient resources adequately to exploit such area. It seems odd that at a time when in this country, with its centuries of experience in coal getting, opinion is steadily hardening in favour of larger mines and mining units, mining laws are being drafted in our overseas colonies which render difficult coal mining on any adequate scale.

Sometimes provision is made for the granting of short term leases, e.g., of 20 years with, it is true, a right of renewal. As the renewal, however, will be on terms as to rent, and royalty, and otherwise, operating in the case of grants of new leases at the date of renewal, it is quite impossible for capital now to know what its commitments are. This leads directly to the next proposition.

4th Proposition. *Capital should be encouraged to assist in mining development and should not be burdened with hazards artificially created.*

Mining is an enterprise essentially hazardous. The difficulties inherent to the enterprise are appreciated, and capital is prepared to face them, but hazards and risks unnecessarily created are of another order. These latter hazards are, however, in some cases very real. One such I stop to consider because I believe it is due to the inability of the disinterested, and honourable, administrator to appreciate certain fears entertained by the capitalist and founded upon the view that administrators may not always be gifted with commercial wisdom even if they are honourable and disinterested. Very many of our overseas laws, instead of giving an absolute right to the grantee who has complied with the terms of the grant, to obtain a grant or to renew the grant, or to amalgamate one grant with another grant, confer a conditional right only, the condition being that some administrator thinks fit to allow that to be done which the grantee desires to do. The effect of any such provision is *that capital assumes that the administrator will not allow that to be done which the grantee desires to do*, and capital makes its deal on that basis. If, on that basis, the undertaking does not appear attractive, capital is not available for development. It is surely apparent that the result is that any such provision is calculated very seriously to affect mineral development. And what is gained ? The gain consists in a greater measure of administrative control, but, granted that all the terms of the lease or grant in question are complied with by the grantee, surely the grantee should be treated as a desirable grantee. It seems difficult to see what objection there could be to him. Another advantage is that values may change with the passing of years and the rent or royalty reserved may become inadequate I refer to my notes to the 7th proposition on this point. The administrator thinks : " For defence or political or financial reasons it may be desirable to determine this enterprise, we will therefore keep this control which will always be exercised reasonably and honestly." The capitalist thinks : " Twenty years term with right to renew if somebody approves ; I cannot rely on renewal, twenty years is useless." Result—no enterprise to control. This has happened to my knowledge many times. If everybody's experience could be drawn upon, I have little doubt that the existence of provisions of this nature in mining laws would be shown to have caused the deflexion of many millions of capital from mining enterprise.

5th Proposition. *Titles should be sure, terms long and areas adequate.*

Security of title is a matter of special difficulty and importance in mining law. The English lawyer, used to conveyances between parties to a contract, finds some difficulty in understanding systems which permit of licensees acquiring rights over lands occupied by third parties for non-mining purposes which rights are based on the original state licence plus work, demarcation and application for a grant. The chain of acts leading to title do not afford documentary proof of title. Thus in many codes, on demarcation being made, an affidavit sworn, and application made, a grant is made, but such grant has no effect unless the ground to which it relates at the time of demarcation was open ground, i.e. was ground not already taken up for mining purposes by somebody else. Again, in many codes it is provided that mining areas must be marked out in such and such a manner, and a proper marking out is an essential step leading to grant. It follows that although there is a grant, such grant may be voidable if the marking out is ineffective. Numerous other examples could be given of provisions which tend to make title doubtful.

There are excellent reasons for all such provisions as those above adumbrated, and it is not suggested that they are undesirable. It is very necessary to guard against the jumper. It is very desirable by imposing adequate labour conditions to stop blanketing. But it is desirable, and possible at the same time, to reach a stage when a sure title can be given, a title which cannot be defeated by proving defects in marking out, by proving absence of miner's right, by proving failure to work, or by proving any other breach of regulations. Every mining law, in my opinion, should make provision for the issue of grants of indefeasible title to mining rights. I use a South African mining term here but I think the meaning is sufficiently clear. To test whether the law is adequate for its purpose, I think the draftsman should consider whether the title he is making provision for is such that a man armed with it can go to a financier thousands of miles away and satisfy him that, subject to enquiries capable of being transmitted by cable as to searches, he has a sound title. If the title is to be found, not merely in a document and a record, but in proof of this, that, and the other events only capable of being proved by oral evidence, then by so much has the law maker gratuitously added to the hazards of mining exploitation and by so much frightened capital away.

There is a further defect of title, but one which, I think, strikes me as a lawyer as being of more importance than it perhaps is. I refer to doubts as to in whom are the minerals in certain cases. As a matter of law, this question in some countries and in some circumstances is an extremely difficult question. To say this is, of course, to say that any title granted to such minerals is uncertain, for it is a cardinal principle that a grantor cannot grant more than he has. The point was raised in the earlier paper already referred to.

It is not enough, however, that title is sure, it must be adequate. If the area is too small, if the term is too short, the proposition ceases to be attractive. I have already given an example of an inadequate coal area. There is really no merit at all in providing for hard and fast maximum areas although this is very commonly done. What is necessary is to make provision that no one shall have the *right to demand* an area larger than he can possibly exploit Even this must, however, be made subject to the prospector's right to demand an area adequate to recompense, and encourage him. This can be done by giving him in any event a right to a small area with a right to a larger area on application made by him, or his nominee, on proof of ability in the applicant to develop such area. The purpose of introducing the nominee is to enable the prospector to transfer his rights to capital, i.e. it is the bridge leading from the activities of the pioneer prospector to the activities of the capitalist. The locking up of large areas can very easily be prevented without incorporating terms that will frighten capital away. It can be, for example, made a condition of the grant that a certain amount of development work must be done or payment made in lieu thereof.

Not only should title be certain, its duration long, and the area in question as large as practicable, having in mind the resources of the grantee, but so far as is at all possible, forfeiture should be avoided. A fine is one thing, a civil claim is one thing; a forfeiture is a very different thing. The objection to elaborate forfeiture provisions is one that, I believe, is not sufficiently understood. That objection is this:—Before a mining enterprise can be commenced to-day, on an efficient scale, very large capital expenditures must be envisaged. It is by no means unusual to sink £1,000,000 in a mine before the producing stage is reached. For any deep mining to be undertaken, very substantial sums must be found. The technique of finance is thoroughly understood by those who find the money. These persons are not mining engineers and do not equally clearly understand the technique of mining. They have their advisers, of course, but it is one thing to be advised and another thing to know. Such men unquestionably regard a law which imposes a risk of forfeiture for acts done, or things omitted, as greatly increasing the hazard. So important do I regard this matter that I would personally exhaust every expedient before resorting to forfeiture clauses. The end to be aimed at should be a grant on known terms that will continue for very many years, if not for as long as there are minerals to get, unless the grantee surrenders (and he should have the right to surrender), so long as a given amount of development is done, and certain payments made and records supplied, and in default no forfeiture until after the most generous warnings and in no case where a fine or other money claim will adequately meet the case.

6th Proposition. *Provision should be made for grants of large areas on special terms.*

In many cases it is highly desirable to depart altogether from the claim or lease system and to grant huge areas of land. Whether such a method of exploitation is desirable will depend upon special circumstances and in particular upon the readiness of financiers to expend very large sums of money in a thorough geological examination of the country in question in return for the grant of such rights. A law should, however, make provision for such a possibility.

This line of development, although it is very present to the minds of the Legal Committee of the Imperial Institute, and through their activities is beginning to find a place in the mining law of the Empire, is one that has not received the attention it deserves. It should not be forgotten that, like many other things, the conditions of prospecting and mining have changed from those which were operating in the West of America and in Australia when, in the middle of the last century, the mining codes that to-day are apt to form the basis of mining legislation overseas, were being worked out.

To-day a well equipped prospecting organisation, prepared to spend £500,000 in prospecting, can cover adequately a very large area. Such an organisation could never begin operations unless it had behind it substantially larger resources ready to exploit the discoveries made. Such large undertakings are not possible, however, unless the law allows of the issue of grants commensurate with the size of the expenditure contemplated and the resources put at risk.

In my opinion, it is wise to encourage capital to take part in the mining and exploitation of the varied mineral resources of the Empire and that in this beneficial work there should be no differentiation between races. It should not be overlooked that no foreigner can remove the mine. Foreign capital that develops a mine enriches the country in which it is. He strengthens the defences of that country. The mineral he can remove but such removal can be restricted and, in case of national emergency, stopped. It might well be desirable, in many cases, that encouragement should be given (by way of differential rates of export tax, or otherwise) to the treating or refining of the mineral got within the country in question or within the Empire.

7th Proposition. *Rents should be small, should merge into royalties which should not be onerous*

I have not space to deal usefully with the question of royalties, which can only be dealt with in detail, but their primary purpose should be to pay, by instalments, for the minerals which are got, and the minerals that are got should not be priced too high. Until they are severed from the earth, minerals have no great value. Indeed, I include this proposition in this paper in order to draw attention by way of concluding remarks to the fact that the wealth brought to a country by mineral development is not brought by way of royalty charges, wayleave rents, shaft payments, dead or other rents, but is brought, and is brought in full measure, by the creation of industry, employment of labour, circulation of money, development of communications, provision of freights, and the thousand and one activities which follow in the wake of those already indicated.

I sometimes wonder whether we sufficiently remember the enormous changes that have already occurred in our lifetime. It is within the lifetime of many that Dr. Livingstone was placed at the head of the Government expedition which reached the shores of Lake Nyasa in September of 1859. To-day only a few miles from that spot the finishing touches are being given to a railway extension designed to deal with the mineral traffic from great copper mines now being developed. Such few miles are in the direction of the unknown centre of Africa into which not even Livingstone succeeded in penetrating. These changes relate to many things connected with prospecting and mining. Survey and prospecting by aeroplane and geophysical methods enormously increases the areas that can be efficiently covered in a given time. Modern methods of mining are different from and vastly more expensive than those commonly in operation when the old gold and mineral laws were being drafted These alterations in methods and magnitudes should be reflected in the laws.

The mineral resources of our Empire, though found in a part may be utilised throughout that Empire ; finance in London need not concentrate on the special development of coal seams in Yorkshire, but can develop on a huge scale mineral resources in territories which in my boyhood were entirely unexplored. Not only can finance do this, it is doing it. Northern Rhodesia, a country but a few years ago untrodden by the white man, has now invested in it millions of British and American capital, an enormous industry is on the way to being developed there, problems such as smelter pollution, smoke farming, and the like, more suited one would think to the industrial areas of the black country than to a wild country but recently discovered, are already beginning to be raised, new railways are being built, roads are being planned and in countless ways mining is developing Northern Rhodesia into a country that will be an industrial country within quite a few years -- by few I do not mean five or ten, but within a hundred years. Within that time changes will take place perhaps more marked than even those that have occurred within the last twenty years. Darkest Africa will begin to give up those enormous mineral deposits which unquestionably are hers. This is the time, if ever there was one, to see that that development is carried out properly so that the irreplaceable mineral wealth thus tapped will strengthen the Empire, enrich our country, and neither injure nor impoverish the native races of the lands from which that wealth will be derived.

DISCUSSION

THE CHAIRMAN, in opening the discussion, said he did not think the lecturer needed to apologise for being dictatorial in his very able resumé of the mining laws of the British Empire, for he had pointed out in a masterly way the directions in which improvements must lie, and that, of course, was very helpful.

The moral that seemed to emerge from the lecture above all was that consolidation of the Empire required, of necessity, unification and simplification of its laws.

The lecture was so full of information that it was not easy to discuss it in the short time at the disposal of the meeting. He had been interested to learn that the Romans had an idea that minerals grew and replenished themselves. It was perhaps almost inconceivable, but a few years ago a friend of his, who had had a distinguished career at one of the older universities, and who was not devoid of scientific training, stoutly averred that he had come to the conclusion, from force of fact, that the thick coal seam of South Staffordshire grew, because he had worked it six times, and the fifth time he would have sworn he had extracted every fragment, but the sixth time he found as much there as there was at the fifth working!

He had occasion recently to study the question of royalties. The system of royalties which had grown up in this country (and he supposed Britain was, with the exception of the Hartz Mountains, eliminating Biblical records, the nursery of mining as we know it to-day) had not been applied elsewhere, apparently, to anything like the extent that it was in Britain. It was odd that private ownership of minerals should be such a characteristic of Great Britain, and to a lesser, though still great, extent, of America, and should exist practically nowhere else.

He thoroughly agreed with the lecturer that the value of minerals in the earth was almost negligible. He had been approached by a distinguished man who was about to speak to the British Association who inquired as to the enormous amount of ungotten coal in this country, and as to whether it could not be utilised in meeting the War Debt, and so on. His reply was that the value of it was only a few pence per ton, because until it was dug out and prepared for sale it had little or no value. A million tons of coal buried in the earth had very little value. The landlord could sell it for about 4d. or 6d. a ton, the average tonnage price for the whole of Britain being about 6½d. That was not rent, of course ; it was sale, and that was about the value of a ton of coal, and even that value did not arise until the coal was worked. This was true of all minerals, even of gold.

LIEUT.-COL. SIR ARNOLD T. WILSON, K.C.I.E., C.S.I., C.M.G., D.S.O., said he welcomed the important reference by the lecturer to the encouragement of capital to take part in prospecting for and in exploiting the mineral resources of the Empire without differentiation between races.

The question of the maintenance of the British Control Clause had recently been raised in a very definite form in British Guiana. The policy of exclusion had probably served a useful purpose in the past, but his personal view was that it was no longer necessary, and might actually be harmful by preventing foreign capital from assisting us in performing a duty which we owed to the world—namely, to develop the mineral resources of which we were the trustees. The present policy had tended to injure British interests not only in the United States, but elsewhere. The maintenance of the "open door" policy was a cardinal point in the economic policy of this country. He need hardly say that these observations applied only to the Crown Colonies ; the Dominions were sovereign states, and could, and did, regulate those matters themselves, and in the Mandated Territories discrimination against other nations was specifically forbidden by the terms of the Mandates

The lecturer had also suggested that it was important to encourage the treating or refining of the mineral got within the country of origin or within the British Empire. Whilst agreeing in principle, he wished in that connection to sound a note of caution. There were many considerations involved, both economic and fiscal. In the case of oil, for example, there was a tendency for European and other countries to penalise refined products in order to encourage refining within their borders. In the case of mineral ores, the primary requirement was cheap fuel on the spot. If this were not obtainable, the ores would inevitably have to be smelted elsewhere. Brazil had, he believed, attempted to insist on the manufacture of iron and steel from its ores on the spot, with the result that the great iron ore deposits of Brazil remained undeveloped. England depended largely upon the import of untreated ores from other countries, and it was not to her interest to initiate legislation on lines which, if adopted by others, might do more harm than good. For example, the Rio Tinto ores had to be imported into England untreated, as they stood, in order to be mixed with our own ores. It was absolutely essential that they should come here in the original state in which they were mined. It would be of no use whatever to import the refined product, and any legislation in the direction of excluding foreign capital, or insisting on local treatment, might have very important results, the nature of which could scarcely be foreseen.

Many other economic factors were involved, which he could not attempt to deal with. In the long run he felt that the interests of the British Empire and of its component parts, and more particularly the Crown Colonies, would best be served by the avoidance of legislative restrictions of that type.

In conclusion, Sir Arnold offered his congratulations to the lecturer upon a most important, and, he hoped, a very fruitful, lecture.

Dr. J. A. L. Henderson, Ph.D., F.G.S., M.Inst.P.T. (Vice-President, Institution of Mining and Metallurgy) also congratulated the Society upon having so opportune a summary and crystallisation of the difficulties which every mining engineer had encountered throughout the Empire in respect of mining law. He hoped it would lead to some means being devised for meeting these adverse conditions, perhaps by some kind of conference with the Dominion and Crown Colonies authorities, with a view to the systematisation of Empire mining laws, so that capital could flow freely from one part of the Empire to other parts, with no doubts as to security of tenure and freedom of operation.

He desired to ask the lecturer if, in his reference to the control throughout the Empire of mining and minerals by the respective Governments, he included those old grants which were fairly extensive within certain parts of the older Dominions and Colonies, which still existed, and in which only the royal minerals and one or two others were excepted, the others being vested in the ownership of land. He presumed that the lecturer would exclude those from his remarks on that subject.

Mr. C. B. Brodigan, A.R.S.M., said he had listened with great interest to the lecture, but desired to know in what way some definite step could be taken to direct attention to the absurd manner in which mining laws came into being. At present, when the Governor of a Colony was suddenly confronted with a mining discovery, he immediately looked up what had happened in other colonies, and so one saw that evil process of borrowing bad legislation which had gone on from Malaya to Nigeria, from Nigeria to another colony like Tanganyika, one colony copying from another. It was generally left to an inexperienced student to interpret those laws, and he interpreted them in the way that was easiest for himself. The result was a hocus pocus of laws which worked exceedingly badly. Take the case of Tanganyika, a territory adjacent to Northern Rhodesia. Northern Rhodesia was advancing in prosperity and importance owing to the fact that its mining law granted adequate rewards to persons able and willing to finance properly equipped expeditions to search for minerals, directly leading to the discovery of the great copper deposits.

In Tanganyika there was no such inducement held out and in many other respects the mining law was faulty. Was it any wonder that in a mineral sense the territory was neglected ?

Would it not be possible to press for the creation of a consultative committee, a sort of reference body to which harrassed and ignorant officials could apply and so get some positive improvement effected ?

DR. WILLIAM CULLEN, LL.D. (President, Inst. of Mining and Metallurgy), said he had intended to raise the same point as Mr. Brodigan had mentioned. Throughout the lecture he had had in mind the difficulty that within the past few years three different mining laws had been promulgated—first for Kenya, then for Tanganyika under mandate, and most recently of all, for Palestine. Presumably those draft laws emanated from the Colonial Office, or the Colonial Office, at any rate, had something to do with them. He had presumed, in his innocence, that the Colonial Office would naturally communicate with the Legal Committee of the Imperial Mineral Resources Bureau, and that some sort of standardisation would be introduced into those laws, while at the same time meeting the local conditions of the country. He could find no such system of standardisation at all. He wondered if, in addition to the Legal Committee of the Imperial Institute, the Colonial Office had at its beck and call a number of advisers on the practical application of mining laws to particular countries, and whether the interests of those two bodies were in conflict. This might account for the extraordinary mining law in Tanganyika, to which Mr. Brodigan had just referred. He had read the law very carefully, and as far as he could see it offended every one of the propositions which the lecturer had put forward. The verb " may " was used entirely throughout the law, and that left the question of title, the question of right to prospect, the question of what anyone must do at any stage of the proceedings, entirely in the air. Those conditions might be imposed on Tanganyika by the Mandate ; he did not know ; but, though one would have expected that that would keep out intending prospectors and financiers, he was assured on the best authority that that was not so, that the people who went there received very liberal treatment in every way; furthermore he was given to understand that the law in Tanganyika was in effect an almost literal copy of that in Nigeria. He was also told that so far as Nigeria was concerned, where the mining law presumably had exactly the same defects, there was also no kick against the financier or the prospector going there, and those people received good treatment. His point was that in both of those laws the final word seemed to rest with the Governor, or some high official. It might be that in nine cases out of ten the Governor was a reasonable man, and would be guided by mining engineers of experience; but it might happen that there would be a Governor who did not appreciate the importance of the discoveries in his territory. It was true that he only held office, as a rule, for three or four or five years ; but he could conceive a set of difficulties arising in that respect. His difficulty was to reconcile the great problem of inserting the word " may," and its indefiniteness throughout the Act, and the fact that capital had been attracted there and was likely to be attracted in even greater quantity.

The lecturer, in dealing with the question of royalties, had given South Africa credit which was its due for its liberal rewards to prospectors, financiers and others. This particular law, though full of anomalies and containing some most exasperating clauses, was very sane on the question of royalties. They were not exorbitant throughout, and he thought that was the one thing which had encouraged the financier more than any other thing. He believed it was a maximum of 5 per cent. on the gross value.

This law had recently been before some friends of his, mining engineers, who had made a thorough study of it from a practical point of view, and they had had to bring in review their experience of laws in other parts of the Empire and foreign countries, and he had been surprised at the wealth of practical information that had been forthcoming in such a short time. He thought that the Government, or even the Committee of the Imperial Institute, in its wisdom, might be well advised, if a consultative body were ever formed, to take the advice of those people, all of whom were members of the Institution of Mining and Metallurgy, of which he happened to be President at the moment. He thought there was a great fund of practical wisdom in regard to mining law to be got from that body.

MR. GILBERT STONE, in reply, said that the question of ownership throughout the Empire could be expressed in this way : that in many of the Overseas Dominions up to about 1886 minerals had never been discovered, and were not thought of, and grants did not reserve minerals, and those minerals were in private ownership throughout, at any rate, Australia ; but the Government was responsible for the control of all those things by means of a system of licensing which must be observed on those properties to enable the minerals to be mined.

On the motion of the President, seconded by Dr. Cullen, a hearty vote of thanks was accorded to the lecturer for his very interesting paper. The meeting then terminated.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY, FEBRUARY 10 Automobile Engineers, Institution of, at the Queen's Hotel, Birmingham 7 p m Mr L H Dawtrey, "Automobile Brakes"

Brewing, Institute of, at the Charing Cross Station Hotel Strand, W C 7 45 p m Dr L R Bishop "The Nitrogen Content and Quality of Barley"

Electrical Engineers, Institution of, at Armstrong College, Newcastle-on-Tyne 7 p m Messrs T W Ross and H G Bell, "Recent Developments in the Protection of Three-Phase Transmission Lines and Feeders"

Geographical Society, at the Aeolian Hall, New Bond Street, W 8 30 p m Colonel F. L. Giles, "Boundary Work in the Balkans"

Heating and Ventilating Engineers, Institution of, at the Borough Polytechnic, Southwark, S E 7 p m Mr B. T. Wingfield, "Automatic Control in Heating and Air Conditioning Installations"

Metals, Institute of, at 39 Elmbank Crescent, Glasgow 7 30 p m Mr S H. Hawkins, "Pyrometry"

Surveyors' Institution, 12 Great George Street, S W 8 p.m Mr J Logie Milne, "The Rating and Valuation (Apportionment) Act, 1928"

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5 30 p m Mr R H Wilkinson, "The Comparative Advantages and Limitations of the Tramcar, Omnibus and the Trackless Trolley Vehicle"

University of London, at King's College, Strand, W C 5 30 p m. Maj.-General Sir F Maurice, "The Campaign of 1915 on the Western Front Lecture III The Battle of Loos"

At King's College, Strand, W C 5 30 p m Prof R. W Seton-Watson, "Outlines of British Foreign Policy (1815-80). Lecture IV - The Forties Palmerston and the New Spirit"

At University College, Gower Street, W C 5 p m Prof. A. V. Hill, "Oxygen and the Recovery Process in Muscle and Nerve" (Lecture IV)

At University College, Gower Street, W C 5 30 p m Prof J. W. Mackail, "The Approach to Shakespeare" (Lecture III).

At University College, Gower Street, W C. 5.30 p m Prof. J. Macmurray, "The Philosophical Approach to Modern Social Problems." (Lecture II).

TUESDAY, FEBRUARY 11 Anthropological Institute 52 Upper Bedford Place W C 8 30 p m Miss G Caton-Thompson "Recent Excavations at Zimbabwe and other Ruins in S Rhodesia"

Automobile Engineers, Institution of, at the King Head Hotel, Coventry 7 30 p m Mr T H Pomeroy "The Double-Six Engine"

Civil Engineers, Institution of Great George Street, S W 6 p m Mr R W Scott Thomson, "The Diversion of the River Ashop"

Electrical Engineers, Institution of, at the Hotel Metropole Leeds 7 p m Dr J Hartmann, "The Jet-Wave Rectifier The Experimental and Theoretical Basis of its Design"

At the Royal Technical College, Glasgow 7 30 p m Mr W B Hird, "The Visit of the Institution to France"

At the College, Loughborough 6 45 p m Mr G K J Parkinson, "Electrical Development"

Eugenics Society, at Burlington House, W 8 p m Mr E J Lidbetter, "Poor Law"

Marine Engineers, Institute of, 85-88 The Minories, E C 6 30 p m Informal Discussion on "Machinery for Future High-powered Atlantic Liners" Speakers Mr J Hamilton Gibson (in favour of Steam Machinery) and Mr J Calderwood (on behalf of Oil Engines)

Metals, Institute of, at Armstrong College, Newcastle-on-Tyne 7 30 p m Mr W Richardson, "Electric Heating"

Petroleum Technologists, Institution of, at the Royal Society of Arts, Adelphi, W C 5 30 p m Mr E H Cunningham Craig, "The Oilfields of Alberta"

Philosophical Studies, British Institute of, at the Royal Society of Arts, Adelphi, W C 8 15 p m Prof Leonard Hill, "The Philosophy of a Biologist"

Photographic Society, 35 Russell Square, W C 7 p m Dr L C Martin, "Studies in Colour Vision"

Royal Institution, 21 Albemarle Street, W 5 15 p m Sir William Bragg, "X-Ray Determination of the Structure of Cellulose"

University of London, at King's College, Strand, W C 5 p.m Dr S Wright, "Physiology of Posture and Movement" (Lecture IV)

At King's College, Strand, W C 5 30 p m Mr C W Marshall, "Electrical Transmission by Overhead Lines Lecture I—The Mechanical Aspects of Overhead Transmission Lines, including Conductors, Insulators and Supports."

King's College, at 40 Torrington Square, W.C. 5.30 p.m. Dr. J. Krzyzanowski, "Two Modern Polish Novelists. Lecture II- -Zeromski's Struggle against Evil."

At University College, Gower Street, W.C. 8.15 p.m. Miss E. J. Davis, "How London Became the Capital of England." (Lecture IV).

WEDNESDAY, FEBRUARY 12..Anthropological Institute. Royal, at the Portland Hall, Great Portland Street, W. 5.30 p.m Mr. H. J. E. Peake, "The Beginning of Agriculture."

British Academy, Burlington Gardens, W. 5 p.m. Mrs. G. M. Trevelyan, "Wandering Englishmen in Italy."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Informal Meeting. Discussion on "The Influence of the Progress of Aeronautical Engineering on other branches of Engineering Work." Opened by Mr. L. A. Legros.

Empire Society, at the Hotel Victoria, Northumberland Avenue, W.C. 8.30 p.m. Commander Sir Dennistoun Burney, "Empire Communications."

Fuel, Institute of, at Burlington House, W. 6 p.m. Mr. C. Featherstone Hammond, "Submerged Combustion."

Heating and Ventilating Engineers, Institution of, at the Holborn Restaurant, W.C. 2.30 p.m. Ordinary Meeting. Mr. Sam Fox, "Half a Century of Boiler Making"

Literature, Royal Society of, 2 Bloomsbury Square, W.C. 5.15 p.m. Professional Lecture.

Mechanical Engineers, Institution of, at the Grand Hotel, Sheffield. 7 30 p.m. Mr. A. H. Mundey, "Die Castings."

Metals, Institute of, at Thomas' Cafe, High Street, Swansea. 7 p.m. Dr. A. G. Ramsay, "The Corrosion of Non-Ferrous Metals."

University of London, at King's College, Strand, W.C. 5.15 p.m. Rev. N. Sykes, "The Social and Political Ideas of some Representative Thinkers of the Revolutionary Era Lecture V—Thomas Paine."

King's College, at 40 Torrington Square, W.C Mr. N. B. Jopson, "The Early Civilisation and History of the Slavs." (Lecture II).

At the London School of Economics, Houghton Street, W.C. 6 p.m. Mr. G. L. Tinker, "Office Machinery. Lecture IV The New Adrema and its Uses."

At University College, Gower Street, W.C 3 p.m. Dr. C. Pellizzi," La Lirica del Paradiso." (Lecture IV).

At University College, Gower Street, W.C. 5 p.m. Dr. R. J. Ludford, "Cytology in Relation to Physiology and Pathology." (Lecture II).

At University College, Gower Street, W.C. 5.30 p.m. Dr. G. Fiocco, "Francesco Guardi, precursore della pittura moderna."

At University College, Gower Street, W.C. 5.30 p.m. Mr. I. C. Gröndahl, "Norwegian Writers of the Present Day (Landsmaal)." (Lecture I).

At University College, Gower Street, W.C. 5.30 p.m. Dr. J. Haantjes, "English Travellers in Holland during the XVIIIth and Early XIXth Centuries." (Lecture II).

At University College, Gower Street, W.C. 5.30 p.m. Mr. A. F. Ridley, "Librarianship as an Aid to Industry and Commerce."

THURSDAY, FEBRUARY 13..Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m Señor J. de la Cierva, "Recent Work on the Autogiro."

Asiatic Society, 74 Grosvenor Street, W. 4.30 p.m. Dr. A. M. Blackman, "The Drama in Ancient Egypt."

Chadwick Public Lecture, at the Medical Society, 11 Chandos Street, W. 5.15 p.m. Prof. Dr. B. Blacklock, "Health in West Africa."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Dr. J. Hartmann, "The Jet-Wave Rectifier."

At University College, Dundee. 7.30 p.m. Mr. G. H. Chalmers, "Lubrication."

Historical Society, 22 Russell Square, W.C. 5 p.m. Anniversary Meeting. Sir Richard Lodge, Presidential Address, "Machiavelli: Il Principe"

Marine Engineers, Institute of, 85-88 The Minories, E.C. Informal Address on "Discipline as applied to the Engine-Room, etc." by Mr. [illegible] N. Kent.

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds. 7.30 p.m. Mr. J. A. McLaren. "High-Speed Oil-Engines."

At the Engineers' Club, Manchester. 7.15 p.m. Mr. A. Coulstock Smith, "Poppet Valve-Gears for Locomotives."

Metals, Institute of, at 83 Pall Mall, S.W. 7.30 p.m. Mr H. H. Smith, "Temperature Measurement and Contro in Works."

Mining and Metallurgy, Institution of, at Burlington House, W. 5.30 p.m.

North East Coast Institution of Engineers and Shipbuilders, at the Cleveland Institution, Middlesbrough 7.30 p.m. Informal Meeting. Discussion on "Are Government Regulations effective in Preventing Marine Casualties," opened by Mr. W. T. Butterwick.

Oil and Colour Chemists' Association, at 30 Russell Square, W.C. 7.30 p.m. Mr. Sidney Smith, "Mixing, Grinding and Refining of Paints and Enamels."

Photographic Society, 35 Russell Square, W.C. 7 p.m. Meeting of Colour Group.

Refrigeration, British Association of, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 5.30 p.m. Adjourned Discussion on Mr. B. C. Oldham's paper on "Some Considerations in Design of Modern Refrigerating Plant."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Mr. T. A. Joyce, "Architecture and the Industrial Arts of pre-Spanish America."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof. R. J. S. McDowall, "The Control of the Circulation." (Lecture III).

At University College, Gower Street, W.C. 5.15 p.m. Prof. J. E. G. de Montmorency, "Momentous Law Suits and Trials in Various Countries from Classical to Modern Times." (Lecture III).

At University College, Gower Street, W.C. 5.30 p.m. Mr. A. D. Lindsay, "The Relations between Ethics, Economics and Politics." (Lecture III).

At University College, Gower Street, W.C. 5.30 p.m. Prof. J. W. Mackail, "The Approach to Shakespeare." (Lecture IV).

Victoria and Albert Museum, South Kensington, S.W. 5.30 p.m. Prof. A. M. Hind, "Early Italian Engravings."

At Bedford College for Women, Regent's Park, N.W. 5.15 p.m. Sir B. Jackson, "Shakespeare in Modern Dress."

FRIDAY, FEBRUARY 14..Engineering Inspection, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Prof. A. F. C. Pollard, "Optical Aids to Engineering Inspection."

Malacological Society, at University College, Gower Street, W.C. 6 p.m.

Mechanical Engineers, Institution of, Storey's Gate, S.W. 7 p.m. Lantern Lecture by Mr. G. Stevenson Taylor followed by visit to the Home Office Industrial Museum.

Metals, Institute of, at the University, St. George's Square, Sheffield. 7.30 p.m. Mr. S. Matthews, "Recent Developments in Measuring Instruments."

Oil and Colour Chemists' Association, at Milton Hall, Manchester. 7 p.m. Mr. R. G. Daniels, "Common Sense and Nitrocellulose Lacquer."

Physical Society, at the Imperial College of Science and Technology, South Kensington, S.W. 5 p.m. (1) Mr. W. E. Summerhays, "The Diffusion Constant of Water Vapour." (2) Mr. M. C. Johnson, "A Method of Calculating the Numerical Equation of State for Helium below 6° Absolute, and of Estimating the Relative Importance of Gas Degeneracy and Interatomic Forces." (3) Mr. F. D. Smith, "The Magnetostriction Constant for Alternating Magnetic Fields." (4) A working model illustrating the mosaic theory of the compound eye, due to Altenburg, will be demonstrated by Mr. Denys Kempson.

Royal Institution, 21 Albemarle Street, W. 9 p.m. Professor A. F. Pollard, "History à la Mode."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prince D. S. Mirsky, "Russian Literary Criticism. Lecture V—The School of Belinsky, Left Wing (1845-1900)."

At University College, Gower Street, W.C. 5 p.m. Mr. G. P. Wells, "Comparative Physiology." (Lecture V).

At University College, Gower Street, W.C. 5.30 p.m. Dr. L. Venturi, "La critica d'arte a Firenze nel secolo XV."

SATURDAY, FEBRUARY 15..L.C.C. Horniman Museum, Forest Hill, S.E. 3.30 p.m. Dr. C. Ainsworth Mitchell, "Tell-Tale Inks."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Rev. G. Cooke, "Tonality and Expression in Song-Writing."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

"*It is the things that are of no use which really make up one's life.*" *Mr Baldwin.*

"*The great artist is much too absorbed in what he has to say to care over much about how he says it.*" *C. E. M. Joad*

A Justified Critic.—The *Observer* pays a high tribute to the work of Mr. D. S. McColl under this heading and writes as follows:

> "Mr. D. S. McColl is giving up active work upon the Fine Arts Commission and the Art Collections Fund—two of the many spheres in which his knowledge and energy have served the public. Beauty has more friends than it had thirty years ago, when Mr. McColl, as a dashing art critic, led the battle against the Philistines and paved the way to the reform of the Tate Gallery. Since then he has proved his administrative gifts both at Millbank and in the control of the Wallace Collection. He can cherish the satisfaction in his retirement of having wielded a very distinct influence upon the outlook of his generation."

In an interesting interview in the same paper Mr. McColl recalls some of his many activities, but the story of his fine influences on everything that concerns the Fine Arts has yet to be told. Journalism in his hands has become literature, and we hope that the greater leisure he may now have will be productive of some permanent contribution to English literature, unless he decides to produce even more delightful water colour drawings. His last contribution to journalism has been a very interesting quarterly "Artwork," which is characteristically distinguished in its form and matter.

We look forward to hearing him in the Society's Room on the 19th on Alfred Stevens, the great English sculptor and draughtsman, whose work is not sufficiently known in his own country.

Bournemouth.—Mr. Clough Williams Ellis has been taking the town to task :—

> "The reference to an expanding borough is opportune, but Bournemouth resents the statement that it is a 'recklessly expanding borough,' and there is indignation at the gibe that she 'has exploited her original natural advantages like a thoughtless glutton, throwing away her municipal stays as soon as they begin to seem irksome,' and at the opinion that 'her present shapelessness makes her seem less like the queen she fancies herself than a dishevelled and dropsical trollop.'"

Bournemouth, says the Mayor, will continue to be a garden city surpassed by none, despite the criticism. More trees and shrubs may be planted every year than in any other town. This is all to the good, but what about all the irresponsible building that is spreading out with no mind or design right away to Christchurch? Is restraint the right word to use for such a weariness of bricks and mortar in what was once such a lovely coast? An appeal was recently made to the rich and prosperous town of Bournemouth to take a hand at saving the foreground of the beautiful Christchurch Abbey from being built over. Surely Bournemouth should have initiated this effort to save a beauty spot that is of such importance to the town. Even now a thousand or so is needed to complete the purchase and hand the property over to the National Trust. "The whole aim of the authorities is to continue beautifying," says Alderman Nethercote—the coast with its wonderful pine woods needs no beautifying, it is only being destroyed by all artificial attempts to do this. Will Bournemouth see that the unspoiled beauty of Christchurch and its immediate surroundings is made safe for ever? Then at least it will be a peaceful beauty spot in all the welter of bricks and mortar that are pouring out from the municipal Bournemouth of to-day.

Ewell, Surrey. Miss Margaret H. Glyn writes from the Mill House, Ewell :—

> "I think your Society will be interested to hear what is going on here. Three years ago I gave a field to the National Trust for the future use of the public and also in the hope that it would save the place from destruction, since I heard a road was proposed to go through it. The road is now being forced upon us in spite of a vigorous protest signed by nearly 1,200 persons, one-fourth of the adult population.",

We are sending to look into the matter more fully and to report on what seems to be a serious menace to a lovely spot.

Windmills.—The quarterlies issued by Mr. Aug. Walker on the subject of water colour drawings are always interesting and worth securing. The last issue on "Windmills in Sussex," by A. Foord Hughes, should be of particular interest to the Society in view of the very interesting lecture by Mr. Jan van Tex, given on January 6th. We trust that all derelict windmills will now be taken in hand and properly repaired by the local authorities in the various districts where they still exist. They still have their economic uses, so there is every argument for their preservation.

Architecture.— A most interesting and stimulating little book has just come to hand (though it is "little" only in size and compactness). We refer to "The Architect," by Clough Williams Ellis, published by Geoffrey Bles in the "Life and Work" series. It is strange that architecture, though it touches life more nearly than any other art, is yet divorced from it in ordinary knowledge and conversation. This may be largely the fault of the architects themselves; they are a harassed unsociable crowd, and the great ones have no time to spread their doctrine, while the lesser lights have little doctrine to spread. Mr. Williams Ellis is an exception , he is an architect of considerable achievement and looks upon life and his art with a splendid breezy common sense which is most refreshing. His story of his work is full of humour and understanding and his psychology of architect and client and the description of his work at Portmerion are in themselves worth reading, as are also the very entertaining account of his early struggles and his statement of the architect's relation to modern life and art. It reveals the mind of a man passionately devoted to his art and yet keeping it in its proper relation to the other arts and to life— that is why it is a rare and refreshing book.

A question which has arisen very forcibly during the last year or so is the relative position of engineer and architect. This has been brought to a climax in the matter of Dorchester House, a most important and telling site to be handed over to an engineer. Everyone realises how important the engineer is in modern life and modern architecture, and our architectural style will be determined for the future only in so far as the architect and the engineer can come to terms over well-proportioned simple buildings. Mr. Williams Ellis puts the case very well :—

> "These things, things for use, for hard competitive use, must above all else be efficient—there is really no other criterion, no other survival value . . . the designers of these things are slaves of natural laws, mechanical, chemical, optical, gravitational, and the rest . . . they are the exploiters, not the creators; there is but one creator and he is the artist, and the architect being an applied artist is as a demi-god between heaven and earth, with his feet in the clay of his foundation trenches and his head among the stars. . . ."

Decorative Art.- There were two interesting developments in decorative painting last week. One was a meeting presided over by Mr. Baldwin, in connection with the paintings which have just been completed in the Refreshment Room and Hall of Morley College— these have been carried out by three young artists, Cyril Mahoney, Edward Bawden and Eric Ravilious, and represent symbolic and Shakespearean subjects ; the other was the exhibition of work by Mary Adshead at the Goupil Galleries. The paintings at Morley College are interesting and vigorous and quite unhampered by tradition or mannerisms, the only drawback to their complete success being that the artists have not sufficiently considered the architectural form of the Refreshment Room ; it is a dull room with no beauty of line, though some definition might have been given if the artists had paid a little more attention to what is, after all, the fundamental idea of mural painting.

In the case of Miss Adshead, we have just the opposite ; she has such a profound sense of architectural form that one can almost visualise the setting of some of her paintings, even though they are only hung on the walls of an exhibition. Here is a fine and original artist who has a very varied equipment at her finger tips and the exhibits range from water colour sketches to large compositions in oils. A real decorative sense runs through all her work, and this combined with originality and a fine breadth of style makes a visit to the Goupil exhibition an hour of real delight. A collector would do well not only to watch Miss Adshead's progress closely but to buy her pictures, and one cannot say more than that !

Miss Celia Bedford at the Twenty-One Gallery shows a good sense of observation in coloured lithographs and one or two excellent heads in chalk and charcoal.

Drama.—Many interesting developments have been materialising dramatically lately, but nothing has been more vital than the news that in the not far distant future Mr. James Pryde is to design the sets for Maurice Browne's production of " Othello." Since Gordon Craig and his following have been spreading their doctrines abroad, people are apt to forget that he was largely inspired in his early days by Pryde and Nicholson. The former works quite oblivious of publicity and the notoriety the majority of artists strive for, but his work is essentially dramatic and his designs for such a wonderful play as " Othello " should be a genuine artistic event.

We have just been reading " Myself and the Theatre," by Theodore Komisarjevsky, and despite the rather banal title, it is a real study and not just names and incidents of theatrical gossip as so many of its kind. Mr. Komisarjevsky sets forth his theories of acting and production and there is a very interesting account of the Russian theatre during the revolution, and of his difficulties in this country in producing Tchekov and other notable plays which men miscall " highbrow."

" I suppose I am the world's worst reader "—Mr. Hannen Swaffer gives publicity to this confession of Mr. Gilbert Frankau. Mr. Swaffer says he always disagrees with Frankau, but goes on to confide in his public his ignorance of much that has meaning for educated minds. Does it really matter what these flippant gentlemen do read ? But it is all to the good that Swaffer says he has read all Thomas Hardy and Dickens; this is a communication of some value for a personality who occupies a whole page of a popular newspaper. We wonder if Mr. Arnold Bennett will think it worth while noticing this rather interesting question.

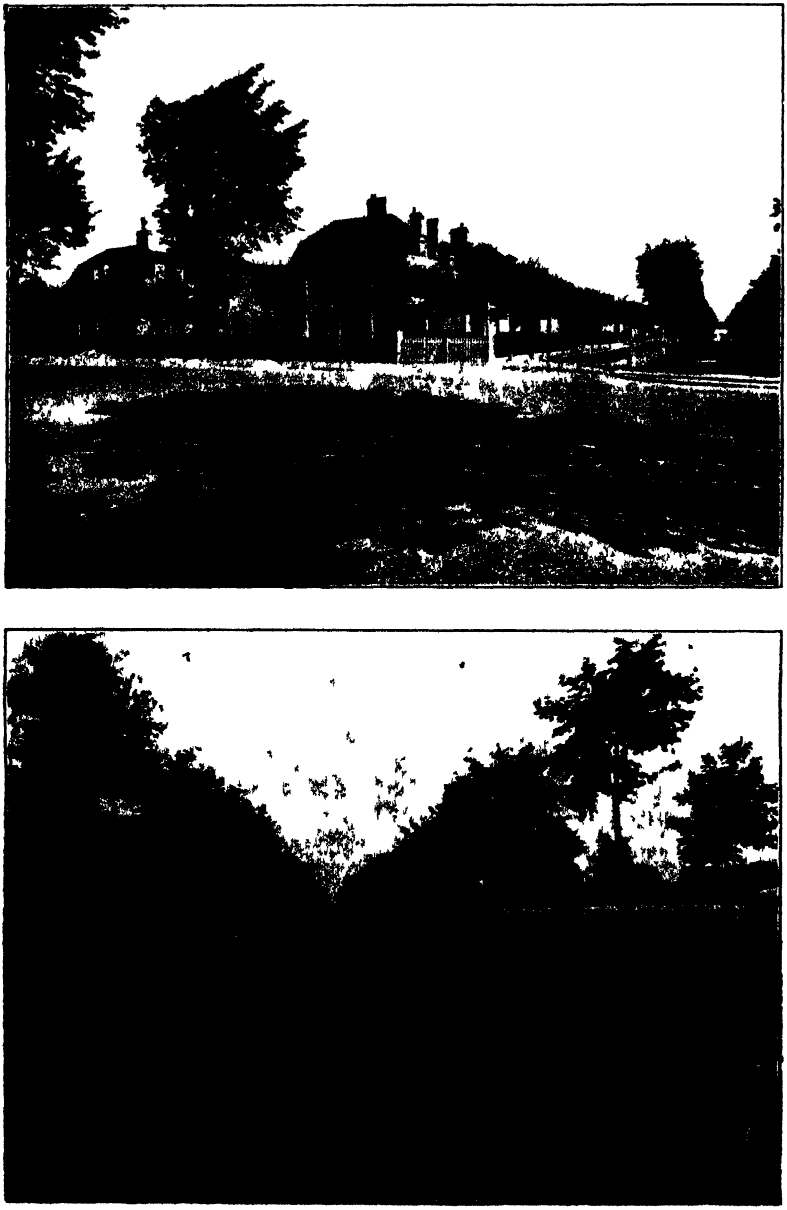
The Ruin of England. -Here is Mr. Arthur Mee's remedy for saving the beauty of England :—

> We can refuse to buy things which are advertised in an ugly way.
>
> We can boycott ugly shops, ugly tea-places, ugly petrol stations, ugly towns, and ugly villages.
>
> The A.A., that good friend of every traveller, could withdraw its patronage from ugly places, and from all hotels not reaching its usual standard.
>
> The Ministry of Transport or the County Councils could do wonders by planting trees along the roads that have already grown ugly, screening these ugly people and their ugly places from the public eye and letting them live unseen in the mess they make.
>
> There should be an architect on every local authority. We want town-planning, country-planning, and national parks ; let us have a National Park Stamp on every land transaction, the revenue to pay for our public architects. It would be making the punishment fit the crime, for those who spoil the land would be paying for those who save it.

He says we want town planning, but we have had it, in fact, for some time and the local authorities have had power for years to control advertisements through the Scapa Society.

The only hope for the future is through the influence of a more educated public opinion, which will bring pressure to bear on officials who are numerous enough already without increasing their authority and powers.

May we say a rather irrelevant word to Mr. Mee ? In the February number of " My Magazine " there is an admirable article on the above subject called " A Crime at the Gate of Heaven." On the opposite page he reproduces a picture which justifies the title of the article almost as much ! Surely the reproduction of works of art in a children's paper should be just as carefully selected as the subject matter, and with the wonder of the Italian exhibition to choose from there is no excuse for such a group as this.



Interesting Planting at the National Institute of Agricultural Botany, Cambridge, referred to in last week's issue

Royal Society of Arts Guest House at West Wycombe.

NOTICES

NEXT WEEK

MONDAY, FEBRUARY 17th, at 8 p.m. (Cantor Lecture). ALFRED B. SEARLE, "Recent Improvements in Methods of Brick-making." (Lecture I).

WEDNESDAY, FEBRUARY 19th, at 8 p.m. (Ordinary Meeting). D. S. MACCOLL, M.A., D.Litt., LL.D., "Alfred Stevens—Sculptor, Painter, Architect."

ELEVENTH ORDINARY MEETING

WEDNESDAY, FEBRUARY 5th, 1930. SIR EDWARD T. F. CROWE, K.C.M.G., Comptroller General, Department of Overseas Trade, in the Chair. A paper on "Some Aspects of the Question of Trade with South America" was read by SIR WILLIAM CLARE LEES, O.B.E., Member of the British Economic Mission to South America. The paper and discussion will be published in the *Journal* dated February 28th.

INDIAN SECTION

FRIDAY, FEBRUARY 7th, 1930. SIR DAVID T. CHADWICK, C.S.I., C.I.E., Secretary, Imperial Economic Committee, in the Chair. A paper on "Recent Mineral Developments in India," was read by MR. G. H. TIPPER, M.A., F.G.S., M.Inst.M.M., late of the Geological Survey of India. The paper and discussion will be published in the *Journal* dated March 7th.

PROCEEDINGS OF THE SOCIETY

TENTH ORDINARY MEETING

TRUEMAN WOOD LECTURE

WEDNESDAY, JANUARY 29TH, 1930

THE RIGHT HON. VISCOUNT CHELMSFORD, P.C., G.C.S.I., G.C.M.G., G.C.I.E., G.B.E., D.C.L., formerly Viceroy of India, in the Chair

THE CHAIRMAN said that it was a pleasure to him to introduce the lecturer, Sir Thomas Holland—a pleasure all the greater because Sir Thomas and himself spent five eventful years of their lives together in India. He would not recite to the audience the innumerable distinctions, both academic and scientific, which the lecturer had gained in the course of his life. They were probably familiar to most of those present, and if they were not, they could be discovered in that admirable compilation "Who's Who." But there was one fact in connection with Sir Thomas Holland which he would emphasise. Sir Thomas now appeared as Vice-Chancellor and Principal of Edinburgh University. He was an Englishman, and it was a remarkable fact that Scotland should take an Englishman for the head of one of its universities ; the converse happened far more frequently.

He would like to dwell on Sir Thomas Holland's wonderful record of work during the war. It was a record very well known to himself, and to many of his colleagues, but he thought it was not so familiar to the British public as it ought to be. Moreover, it was germane to the subject which Sir Thomas Holland was to treat that evening. He was to address the Society, not merely as an eminent scientist and geologist, but as a very real and practical administrator.

In April, 1916, when he (the Chairman) went out to India, he found that Sir Thomas Holland had been appointed Chairman of the Indian Industrial Commission. Sir Thomas arrived in India, to the best of his recollection, a month or so after his own arrival, and he spent the hot season in making a preliminary survey by himself of the whole field in anticipation of the work of his Commission, which, he thought, did not actually meet until about October.

In January 1917, the Government of India had been forced by the course of the war to realise that, apart altogether from its military effort, which up to then had been the only effort it had made, it was necessary for it to mobilise all its resources for the prosecution of the war. It might be that some people thought that the Government of India was rather late in taking that decision. However that might be, the decision was determined upon, and it was decided to set up a Munitions Board. He thereupon asked Sir Thomas Holland to take on the duties of President of that Board, in addition to those of the Chairmanship of the Industrial Commission. Perhaps he might summarise the work which was done by that Board. It would be familiar to a great many present that India, while it was peculiarly rich in raw materials —all that were really necessary for the life of the community—was singularly deficient in regard to the manufacturing of those materials and to the production of such articles as were regarded here as essential, whether fo peace or war. As a result of Sir Thomas Holland's efforts the Indian resources of raw material were effectively mobilised, and in a very short time India became the main source of supply of all railway equipment for Mesopotamia, for Egypt, for Palestine, and for East Africa, and practically the sole purveyor of manganese ore and mica for the Allies ; and whereas prior to the war, wolfram had been forthcoming in small quantities in Burma, Sir Thomas Holland secured that the output of wolfram rose to about one-third of the total output of the world. Further, India provided all the timber for the spheres of war he had just mentioned ; it also produced textiles for the British Empire—khaki cloth and the like—and, of course, it produced the greater part of the necessary jute, whether raw or manufactured. Another commodity produced to a very great extent was hides, both raw and tanned. All these enterprises were due to Sir Thomas Holland's amazing gifts of organisation and drive. He had said sufficient for the audience to realise that the lecturer of the evening was not merely an eminent scientist but a very practical organiser and man of affairs.

The Trueman Wood Lecture was then delivered as follows:—

INTERNATIONAL MOVEMENT OF MINERAL PRODUCTS IN PEACE AND WAR

By Sir Thomas H. Holland, K.C.S.I., K.C.I.E., D.Sc., LL.D., F.R.S.

Vice-Chancellor and Principal of the Edinburgh University

"The building of the institutions of peace is the most distinctive enterprise of our time. We are still in the preliminary stages, engaged in the study of architecmost immediate significance to our present theme; it is fundamentally important, whether we consider the question of tariffs, the conservation of resources for possible future use, or the control of mineral movements during a state of war. It is to the effect that no single country is self-sufficient as regards the variety and the quantity of the mineral resources that are required, either for the maintenance of civil activities in peace-time, or, therefore, for meeting the much greater requirements of war.

The two American mining and metallurgical societies, when publishing the findings of the Leith Committee, authorised the following covering comment:—

> A study of these papers will be most illuminating as showing how little can nations stand alone, any more than can men; how greatly is our material prosperity and our standard of living dependent on far-flung trade, and how even our great United States in its continental sweep is not self-contained in its minerals.

Even if we could similarly treat the whole British Empire as a national unit, the same remarks would hold good, in spite of its much greater total area, the widely scattered positions of its constituent parts, and the greater amount of its land which has not yet been completely surveyed by mineral specialists.

There is, however, one more geographical area that may some day form the nidus of a national unit, namely, the mysterious Chinese part of the "Far East," with its little-known natural resources available to a population of patient, industrious workers that have been likened to a nest of ants. China is larger than the United States, and is a compact land-area, varied in geological features—a country which before the War we might have regarded as rich to any possible degree in mineral resources. But during the past ten years several propositions, which were previously known vaguely, have been examined critically by mining geologists; and one by one they have failed to show any assemblage of complementary constituents on which to base a family of metallurgical industries such as we are familiar with in the countries bordering the North Atlantic ocean.

Mr. H. Foster Bain, the distinguished American mining engineer, who has examined many "promising" deposits in China, and has made an extensive study of its industries generally, has summarised his own observations and those of other explorers in a way that practically settles all doubt about the nature of the supposed "yellow peril."[6] Professor E. F. Gay, of Harvard University, summarised his impressions of Mr. Bain's studies as follows:—

> "No modern country can be self-sufficient, but, with this serious limiting factor, least of all can the countries of the Far East, as they become modernised, be economically independent. Their growing nationalism—an inevitable and desirable development—may find bounds set, both for peace and war, by multifarious needs for railroads, steamers, machine-equipment, which can be satisfied in their fuller extent only by importation and the resulting ever-closer international relationships. Gradually developing those manufactures which can be exchanged for the essential metal products, and struggling with an even more difficult food

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[6] "Ores and Industry in the Far East," published by the Council on Foreign Relations, Inc., New York, 1927.

problem, the countries of the Far East must, it would seem, become steadily more dependent upon those regions which are technically more advanced and in minerals much richer."

Before postulating as a basic fact that no country is self-contained in the matter of mineral resources, it may be well to anticipate one inevitable form of criticism, namely, that there are still large areas of the world which have not been surveyed in sufficient detail to justify a negative conclusion of the sort. We must admit that to a certain degree this is true ; it is true, too, that several important discoveries of ore have been unexpectedly made by accident, and that some such local surprises[6] are yet probable ; it is true that we know little about Central Africa and the hinterland of China ; it is true that a mineral deposit of great local value may be an inconspicuous feature in a jungle-covered area of the tropical belt, or in the forest lands of Canada and Siberia.

But during recent years, and especially during the last decade, the area of such possible surprises has been markedly narrowed, not only for particular minerals, but more especially for assemblages in variety sufficient to maintain those families of industries that are necessary to establish national independence. We know enough now to be practically sure that no geographical unit controlled by any one nation will ever be found to equal the British Empire for variety, or the United States for quantity of essential mineral products. As Professor Leith has said, " Changes will still be made by discovery, usually in expected fields, but the main outlines are now pretty well fixed. The curve of geographic discovery is falling. The great discoveries of the future will in the main relate to better methods of recovery and use."[7]

And against this chance of surprise through further discovery of concealed mineral deposits, we must place the recent tendency towards large-scale production, which is putting out of effective action many deposits that were formerly treated as of local importance. Further deposits of local importance will doubtless be discovered, but there is little hope of finding any assemblage that will establish another great industrial power.

That we are living in an *era* which above all previous ages is dependent on minerals is generally appreciated ; but that a new *period* in that era, marked by large-scale operations, has opened with this century is less generally recognised. In the latest quarter century of its history " the World has exploited and consumed more of its mineral resources than in all its previous history, back to the time when Eolithic man first shaped a flint to increase his efficiency as a hunter."[8] This consumption is proceeding at an accelerating rate, and the large-scale period of the mineral era is now showing even another new phase, tending towards the geographical restriction of large-scale exploitation to a few limited areas that are

[6] For example, the copper-nickel deposits of Sudbury in Canada, and the iron ores of Chota Nagpur and Orissa in India may be regarded as surprises of the sort.

[7] " Exploitation and World Progress," *Foreign Affairs*, New York, October, 1927.

[8] Holland. Presidential Address to the British Association, 1929, pp 8 and 9

specially endowed with those basic metals and fuels on which the web of modern industry is based.

The mineral deposits of the World are the outcome of a complex natural process of segregation and local concentration which has been going on for geological ages within the Earth's crust; and those which are rich enough at accessible depths are exploited to maintain the modern form of civilised activities. The corresponding processes of ethnographic segregation and concentration which have resulted in the formation of national units have marked out a quite different set of geographical boundary lines.

Although many expeditions for conquest have been inspired by prospects of gold and precious stones, the actual colonisations of undeveloped new land, as well as the determination of boundary lines for the older nations, have been established mainly because of agricultural interests. The lands that are most suited for agricultural development do not necessarily cover the areas that contain workable mineral deposits; indeed, more often the mineral-bearing regions are not well suited to cultivation, and consequently this late phase of economic expansion, based on the utilisation of mineral products, has upset the old-established political equation; new conditions have now to be faced.

In parts of Europe since the War, the political units which constitute nations have even become sub-divided and more sharply defined under the influence of "self-determination" applied in the ethnographic rather than in its economic sense. The political desire to become self-contained is fostered without regard to the fact that modern industrial activities compel the movement of mineral products from one country to another. The industries of Great Britain, for example, could not now be carried on without copper from foreign sources; for this small country consumes, even in peace time, twice as much of the metal as the whole Empire now produces.

By reference to a few examples it is possible to form an idea of how the World's industries would be affected if the chief suppliers of minerals wished, and were able, to prohibit exports in accordance with a policy of conserving their resources for possible needs in the future:—China supplies about two-thirds of the World's needs of *antimony*.[*] The British Empire produces 90 per cent. of the *asbestos* supplies, and 63 per cent. of the *chromite*. Canada and the Belgian Congo share practically the whole output of *cobalt*. The United States produce half the World's supplies of *copper*. More than half the production of *gold* is South African. Of the *pig-iron* produced, over three-quarters is smelted in the countries bordering the North Atlantic. Over one-third of the *lead* is raised in the United States. India and the Gold Coast between them produce one-third of our supplies of *manganese-ore*. India and Brazil share about equally the output of *monazite*. Canada produces 90 per cent. of the supplies of *nickel*. The United States raise seven-tenths of the *petroleum* supplies. Adjoining fields in Germany and France produce over 90 per cent. of our *potash*. About one-half of the *quicksilver* is obtained from Spain. Nearly half the *tin-ore* raised is from British Empire sources, one-third being from the Malay States. Of the 1⅔ million tons of *zinc* obtained in 1926, over half-a-million tons came from the United States, and nearly one-third of a million was British in origin.

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[*] As a guide to these approximate fractions, I take the official figures for 1926 to 1928, which are now nearly complete for the countries referred to (see Table on p. 390.

It is obvious from these rough figures that the World's industries could be dislocated at any time by a selected series of prohibitions or prohibitory tariffs under normal peace-time conditions, whilst any Great Power could be hampered, and in most instances practically paralysed, if cut off from the rest of the World during war. *Germany*, for example, depends almost entirely on foreign sources for her supplies of aluminium, antimony, asbestos, chromite, magnesite, manganese, mercury, nickel, petroleum, phosphates, sulphur, tin, tungsten and zinc ; and has insufficient natural supplies to meet her domestic demands for copper, iron, lead and mica. *France* has a still longer list of deficiencies ; she could raise her own bauxite for aluminium, iron-ore and potash with some to spare, but has insufficient antimony, coal, magnesite and phosphates, whilst she is dependent almost entirely on foreign chromite, copper, lead, manganese, mercury, mica, nickel, petroleum, tin, tungsten and zinc. Even the *United States* would be embarrassed if cut off for long from foreign supplies of antimony, chromite, magnesite, mercury, mica and tungsten, and they depend almost entirely on outside sources for asbestos, high-grade manganese-ore, potash, nickel and tin.

Although *Great Britain* has a surplus of coal for export, it could not, at normal prices during peace-time, supply its own needs in any of sixteen minerals just mentioned, except possibly iron-ore, of which, however, high-grades are conveniently imported from the countries on the eastern shore of the North Atlantic, the amount so obtained being about half that raised in Britain. If, however, one takes into account as well the produce of the Dominions and dependencies, there would be enough of all, except antimony, mercury, potash, petroleum and copper, whilst, as regards the last-named two, British capital controls foreign sources sufficient just to cover ordinary needs. The surplus available for export of some of these minerals puts the Empire—if regarded as one political unit—in a position to dominate the markets of the World.

Italy can meet its own needs in aluminium, mercury and zinc, but would be embarrassed seriously if cut off from outside supplies of any of the other minerals quoted. The mechanical industries, which have reached such a high degree of efficiency in Italy, are mainly dependent on imported scrap ; and thus are more vulnerable than those of countries which can raise temporarily their own requirements of raw materials.

Japan can spare some sulphur for export, and under peace-time conditions might be self-supporting for copper, zinc, and perhaps mica ; but could not from her own natural resources provide any serious fraction of the full requirements for war.

WAR CONDITIONS.

It is obvious that Germany had realised before the War the importance of mineral supplies, and had reckoned on accessory sources that will never be available in future. Germany seized at once some parts of France and thus secured her increased wants in iron-ore and coal, with the metallurgical facilities of Belgium. She could count on the import of tin from the Dutch East Indies, with Holland as a neutral ; she could for the same reason get aluminium from Switzerland, and, with little risk of interruption at sea, some nickel, copper and molybdenum from Scandinavia ; she also had accessible the resources of Austria, Roumania, Bulgaria and Turkey for graphite, petroleum and magnesite. And yet the absence of the few minerals which were still essential was sufficient ultimately to precipitate the end ; even with these extended areas the Central Powers were still embarrassed from 1915 onwards.

At the commencement of the War, nickel of Canadian origin was refined largely in the United States and was thus free for export, without challenge as contraband, through Scandinavia to Central Europe ; but, before the end of 1915 the shortage of nickel became serious ; even the 5-pfennig coin had to be withdrawn and replaced by iron, and when the "Deutschland" returned from America, in September, 1916, with a small consignment of 325 tons of the metal, there was national jubilation over the success of the trans-Atlantic submarine excursion, forgetful of the circumstance that this was merely a small, though dramatic, incident showing the disquieting efficiency of the blockade. Economy in copper was enforced as a further necessity in the replacement of brass by iron, even for weights ; and then later the shortage of phosphates, previously obtained from Curacoa, Tunis and Florida, began to tell on the agricultural output of food supplies. The story of tungsten has often been related as an instance of short-sightedness on both sides ; it is not necessary to repeat it here ; for, whether embarrassment was due to one, two or more minerals, matters little for the present argument, so long as the missing minerals were essential for war activities in the accustomed sense.

One of the most interesting of these war illustrations was afforded by the mineral cryolite, which is used in the electric smelting of aluminium, and occurs only in one place in the world, namely, in Greenland, a Danish possession. The crude mineral was refined at Copenhagen, and this source of supply was even more important to the Western Allies than to the Central Powers, for Germany was able to make artificial cryolite. Thus, Denmark, as a neutral, held a powerful key-industry which could be used, if necessary, as a serious embarrassment to the Allied Nations.

SCHEMES DESIGNED TO ENSURE PEACE.

It is now obvious from what has been said that the distribution of mineral deposits which is independent of any national boundary lines, has a commanding influence on the conditions of war ; and it is this circumstance that might be turned to account as a means for giving effect to the two recently-established agreements for the maintenance of peace—the League of Nations and the Pact of Paris.

We can safely assume that, in spite of these efforts to develop international understandings and in spite of even the formulation of treaty obligations, there is still some danger of a war developing on a large scale between Great Powers. So long as the Great Powers maintain armies and navies on the present scale, it seems justifiable to regard this assumption as inevitable and necessary. Agreements to limit naval building, such as that now being discussed by the representatives of the five principal Powers, assembled here in London, have admittedly some economic value in reducing the financial burden of armaments, but they have less value as an insurance of peace. It is true that competitive naval building provokes a war atmosphere ; indeed, every military and naval tactician is liable to be influenced by the feeling that it is foolish to have an efficient warlike machine unless it be used.

To some extent the reduction, or even an agreed limitation of armaments, makes for a consciousness of unreadiness, and therefore tends psychologically to keep the military advisers of all nations more or less in a modest frame of mind. But the very existence of a trained army and a well-equipped navy of any size indicates a significant want of international trust and confidence ; they are therefore potential dangers. Everyone remembers, too, that, soon after the Great War started, our navy, to some extent, and our army, enormously, was expanded, not only beyond the scale which was planned by military strategists. but many times beyond any scale ever thought of previously as necessary or likely.

One cannot hope that in the near-enough future the great nations will reduce their military machinery to negligible proportions by mutual agreements of the sort that are now being attempted. Nor, so far as my argument is concerned, is it necessary for them to effect such reductions. The scheme suggested in the sequel is designed to inhibit the use of any armament, large or small, during a threatened or actual breach of international peace.

The problem has been to find some form of practical veto which can be put into operation without the danger of collateral international complications—complications of the kind that would follow, say, interference with the freedom of the seas, or the declaration as contraband of articles and materials that would seriously affect commerce and finance. For a maritime nation these would require a fleet in sufficient strength to effect the legal search of neutral shipping during War.

Any forcible interference with neutral shipping incurs always the danger of extending the area of the war zone ; we had many instances of this during the Great War before the Americans came in on the side of the Allies. More than once there was a danger of America getting off the fence on the wrong side. Then, too, the exercise of restraint in this matter meant that we probably sometimes allowed conditional contraband to get through rather than run the danger of further complications with neutrals. For example, we were well aware of the fact that Canadian nickel matte was sent to the United States for refining, whilst the refined metal went from there to Scandinavia and thence to Germany to be used against our own armies.

And that illustrates the very difficult question of *conditional contraband*; that is, articles or materials that during a war might be turned to account as munitions, although ordinarily used for purely civilian services. In the old days the definition of contraband was relatively easy, because the articles almost entirely, and the materials mostly, which were wanted as munitions, were very specialised and could easily be defined. The last War demonstrated that any such distinction between materials wanted solely for the army and materials wanted for essential civilised activities were similar and interchangeable up to some nine-tenths of the total. What an army now wants in the field is similar to a large extent to what the civil population *must* have to carry on their essential activities. And thus, if a nation tries to prevent its enemy from receiving munitions, it is compelled to stop nearly all trade with neutrals; in other words, nearly all things can justifiably be now classed as "conditional contraband."

Many will remember how our Government delayed to declare, as contraband, cotton from the United States sent to Central Europe. The cotton which was sent ostensibly for the clothing necessities of the civilian population, and never previously regarded as contraband, had become, through the development of technical science, an important and almost vital necessity for the manufacture of high explosives From the cereals wanted for food the acetone required for cordite was made on a large scale during the War by a process that was little more than a laboratory exercise before 1914.

Transmutations of this sort that are now possible by the modern development of science have changed the whole question of contraband in international law. Thus, trade in those materials that can be turned to war account as munitions, cannot be stopped unless we run the danger also of starving civilians, or of endangering their essential supplies of clothing, and even of medical supplies; and this danger is important to realise because privations of the sort create sympathy among neutrals, and so incur the risk of an extension of the war area.

Interference on a necessary scale with ordinary civilian trade between a neutral and an enemy is followed by the usual financial troubles of a kind that tend to turn the neutral into an enemy; at any rate, it destroys the value of the neutral as a source of money; and the power of those who have money to lend during war time is so great that any such proposal as the "economic sanctions" prescribed by the League of Nations must obviously break down if any two Great Powers should go to war. This is evidently one of the weak features of the machinery devised by the League of Nations.

THE LEAGUE OF NATIONS.

It can be claimed for the League that it has been so far a greater success than any previous scheme for the prevention of war. Its frequent meetings for the institution of a common understanding regarding such questions as the trade in noxious drugs, conditions of labour and other social problems, have indirectly done as much good as its direct work in dealing with about half-a-dozen serious incidents of a kind that might have led to war—probably would have led to war—if no such machinery as the League's Council had existed.

So far the evidence is favourable, but it must be admitted that the League has not yet been faced with any serious dispute between first-rank Powers. And if it were so compelled to use any such measure as a blockade to carry out its sole restraining instrument of economic boycott, there would be developed internal stresses in the organisation, probably well beyond its elastic limit, with resulting strain and possible fracture.

If any Member of the League breaks its covenant to keep off war for the prescribed six-plus-three months of negotiations, the other Members can join in severing economic and financial relations with it. Just think for a moment what that would mean to the World's commerce; think of the financial pressure that would be put on their Governments; think of the jealousies aroused by seeing some neutral State establishing new connections in the markets previously occupied by those who are compelled to abandon them for the sake only of a principle; think of the possibility of any one State finding some legal loophole to its own satisfaction to show that the offending Nation did not actually in legal terms declare war, but acted in self-defence; for in nearly every instance of war there is some justifiable difference of opinion about who started it. If any one of the large family of nations considered it necessary to support the alleged offender, *that* one would secure some economic or financial advantage, and so others too would naturally find similar excuses. That there is a real danger in this way of the so-called economic sanctions proving ineffective is admitted by many far-seeing supporters of the League.[10]

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[10] The "sanctions" of the League and their process of enforcement are contained in Article XVI of the Covenant, and are as follows:—

> 1. Should any Member of the League resort to war in disregard of its covenants under Article 12, 13, or 15, it shall *ipso facto* be deemed to have committed an act of war against all other Members of the League, which hereby undertake immediately to subject it to the severance of all trade or financial relations, the prohibition of all intercourse between their nationals and the nationals of the covenant-breaking State, and the prevention of all financial, commercial or personal intercourse between the nationals of the covenant-breaking State and the nationals of any other State, whether a Member of the League or not.
>
> 2. It shall be the duty of the Council in such case to recommend to the several Governments concerned what effective military, naval or air force the Members of the League shall severally contribute to the armed forces to be used to protect the covenants of the League.
>
> 3. The Members of the League agree, further, that they will mutually support one another in the financial and economic measures which are taken under this Article, in order to minimise the loss and inconvenience resulting from the above measures, and that they will mutually support one another in resisting any special measures aimed at one of their number by the covenant-breaking State, and that they will take the necessary steps to afford passage through their territory to the forces of any of the Members of the League which are co-operating to protect the covenants of the League.

THE KELLOGG PACT.

Although the United States' Senate refused to ratify President Wilson's policy to accept the Treaty of Versailles and therefore the Covenant of the League of Nations, a movement to establish treaty obligations for ensuring peace developed independently, and finally took the form of a multilateral treaty for the renunciation of War as an instrument of national policy. This treaty, known as the Pact of Paris and more popularly, as the Kellogg Pact, has now been adopted by some 56 nations, being ratified by the United States' Senate on the 15th of January, 1929.

The Kellogg Pact prescribes no form of compulsion, such as that included in the Covenant of the League, but in the moral sense it goes further in renouncing war as a national policy. Its instrument of force is what General Smuts has called a moral sanction. Its prompt adoption may be accepted as testimony to the remarkable progress made by the League of Nations in getting the nations to think in terms of peaceful settlement instead of by threat of arms. The activities of the League's Council and of the International Court of Justice have been acting during the past few years as a lightning conductor, quietly drawing off the electricity, and so reducing the potential of electrified war clouds. But a lightning conductor is of little use in an actual thunderstorm; and so, too, neither the League nor the Kellogg treaty would prove to be effective in an actual war, whilst enforcement of the well-discussed Article XVI might actually convert a local into a world war.

THE PROPOSED MINERAL SANCTION.

The real problem is to discover some instrument which can be used promptly, without interfering with food, clothing or other civil necessities; some measure that can be adopted with the minimum of interference with commerce and finance; some form of prohibition that cannot arouse international jealousies by the usurpation of deserted markets. We want some instrument as simple as taking away the sparking plugs of a road-hog motorist, without otherwise damaging his car; something of the kind that makes the increase or decrease of navies a matter of relatively small importance; something that can temporarily paralyse the most powerful navy, if necessary, without interfering with trade, or otherwise damaging the fleet; something indeed that will force any nation to appeal to the League of Nations before much blood is spilt; some embargo so obviously effective that no nation will even attempt mobilisation.

It is obvious, from what has been said about the power of science to transmute one product to another, that the whole class of organic materials must be ruled out as dangerously unreliable; but science has not yet been able to transmute metals, and cannot manufacture any substitutes for most of the minerals that are essential in war. So far as we can see, it will never succeed in these respects for some generations, if ever, at any rate on a war scale.

Thus, it seems worth while to explore the possibility of finding in the mineral world some kind of "sparking plug" that is essential to the military and naval "car," and one that can be withheld from any nation that may break the pact of peace. If we can do this without disturbing the ordinary commercial and financial currents of the world, we may be able to force the offender to go to Geneva at once and so give time for the hot blood to cool down.

By recalling the lists of outstanding deficiencies already given for the leading Great Powers, it will be obvious that Germany, France, Italy and Japan would never risk a war-venture if there were any danger of the other nations acting in concert to refuse supplies of the specified minerals ; indeed, there would be serious dangers of unknown dimensions if only a small number of other nations refused supplies. It would be a rash venture for any Power to undertake a war if either the British Empire, or the United States refused to permit the export of minerals to the adventurer ; and any country that attempted to break the pact of Paris would be paralysed if these two agreed to withhold mineral supplies.

It is suggested, therefore, that each country should add a simple rider to its Kellogg treaty with the United States, giving its Government the power, if and when necessary, to prohibit the export of mineral products to any country that breaks the peace with any other member of the Pact. The very existence of any such power would be in itself sufficient automatically to enforce submission of the matters in dispute to the International Court of Justice.

This suggestion in no way clashes with Article XVI of the League's covenant ; the more serious obligations of the " economic sanctions " may be allowed to stand as an ultimate instrument to be enforced if necessary. On the contrary, what may be called the " mineral sanction "[11] would be in effect a first stage of the so-called economic sanctions, but it would not involve a general upset of the World's commerce and finance ; it would not seriously affect the prices of civil necessities, even in the country that is penalised ; trade in all commodities, except in minerals, would continue with all countries, and even in minerals with all countries except one, for export would be safe to all countries that adhere to the multilateral treaty ; no one of them would re-export to the refractory nation.

An agreement of this sort requires no military or naval machine for its enforcement. There is a fundamental difference between the methods of controlling exports and imports, for illicit imports are possible only when exports are free and uncontrolled elsewhere— a circumstance now well appreciated across the Atlantic. The smuggling of minerals outward in a general cargo could not be successful on any scale of importance to a serious war, in which munitions are not only necessary in quantity, but with certainty and regularity to fit with plans for military operations.

The objections to the suggested scheme can be met by two-counter questions : — Why insist on " the severance of all trade or financial relations, and the prohibition of all intercourse between their nationals," when a much simpler prohibition is sufficient ? Why " recommend to the several Governments concerned what effective military, naval or air force the Members of the League shall severally contribute to the armed forces to be used to protect the covenants of the League,' when the Port Officers can readily stop any War with no further force than refusing "port clearance" to any ship carrying minerals to the covenant-breaker?

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[11] I am indebted to General J C. Smuts for this term

The "economic sanctions" of the League may stand as an ultimate resort; but some simpler method that can bring the "covenant-breaking State" to reason is quite sufficient, so long as it is in a form that all nations can agree to accept as a common measure. The proposed mineral sanction is one that offers—so far as one can foresee scientific and technological developments—relative permanence as well as simplicity; the trend of modern technology is in the direction of making mineral products not less but more definitely essential in future, first by the utilisation in the arts of further varieties, and then by their use on an increasing scale for the manufacture of both civil and military machinery. The tendency is in a direction that increases international dependence rather than the reverse. For example, until the end of the last century there was very little known of the ferro-alloys. Manganese-steel was first introduced by Sir Robert Hadfield in 1888, but it was only slowly that metallurgists discovered the remarkable effects of alloying iron with those metals that range in atomic number from 22 to 28—titanium, vanadium, chromium, cobalt and nickel, as well as with the heavier metals molybdenum and tungsten. Our knowledge of these alloys and their properties is still rapidly developing, with consequent changes in mechanical designs and with increased variety of use. No branch of applied science appears to be making more rapid progress just now than the metallurgy of alloys, which shows a tendency to utilise a wider range of metals, with increased range of applications to the arts of peace and war.

The utilisation of some minerals that were previously of nominal value is not being followed by the disuse of others; for output is increasing in quantity more rapidly than it is extending in variety; and so mineral deposits that till recently were of little value are becoming of international importance, just as mechanical luxuries mechanically become mechanical necessities.

It is advisable to anticipate one inevitable form of criticism, and that is the possibility of any nation accumulating stocks as an insurance against a probable shortage during war. Among the objects which the Leith Committee had in view was that of ensuring security to the United States in time of national emergency The Sub-Committee on antimony recommended the accumulation of a stock of 4,000 tons by the Ordnance Department, whilst that on manganese-ore recommended the accumulation of not less than 600,000 tons to be held "at a suitable location for tiding over a war emergency." Without making proposals as definite as these, the other Sub-Committees on special minerals also discussed measures for obtaining security during war.

But this line of thought was not pursued further by the Leith Committee as a whole; they devoted themselves mainly to the commercial influences of the after-war tendency towards a narrow and exclusive form of nationalism.

As the result of our discussion of these questions at the Institutions in London and at the Empire Congress in Canada during 1927, it became obvious that any attempt to accumulate stocks as a safeguard against war-time embarrassments must prove to be impracticable. The increases of consumption which occurred during the Great War varied for different minerals, but were so greatly in excess of peace-time industrial needs for most of them, that the stocks required to ensure any substantial degree of security would incur the lock-up of larger sums than any legislature would tolerate. Stocks on a war-time scale, also, would be so much in excess of normal consumption that they would be regarded by the commercial world as a constant menace to prices, tending to discourage enterprise in production because of the vague fear of the unloading stocks in consequence of a change in policy, or of a change in the estimates of war necessities. The shortcomings of most nations, due to their unequal and unalterable resources, are too large and too varied for any such form of artificial re-adjustment. As already stated, the whole tendency of technical evolution is in the direction of widening, instead of restricting, the variety and quantity of mineral products that are necessary to meet industrial demands and therefore also of war munitions. Any nation that contemplates war in future must first count the cost in minerals ; beyond question the possession of a full supply of the essential minerals is, above all, the controlling factor in problems of strategy.

Critics will notice also that this project requires general acceptance to be fully effective ; otherwise, it would be liable to evasion by export to any neutral country, with re-export to a belligerent. This applies equally to the Capper scheme referred to later ; if the United States refused to supply munitions to any nation which breaks the pact, some, but not complete, embarrassment would follow, and still more if the United States and the British Empire combined to refuse mineral products by direct export. The essence of the scheme requires free and full commercial relations with all those nations in the Pact, on the understanding that none who is loyal will re-export mineral products to the provocative belligerent

THE CAPPER RESOLUTION.

The suggestion that the newly-developed configuration of the mining and metallurgical world offers a means for making effective the treaties recently signed to secure peace, was first made last July as a by-product of my Presidential Address to the British Association. The proposal was drafted before my departure for South America early in the year; but on my return, preparatory to starting for South Africa, I found that Senator Arthur Capper of Kansas had introduced into the United States Legislature a resolution inspired by a similar principle, extended, however, to include munitions of all sorts ; and his formal priority for any proposal of the sort was acknowledged by a revision of the last page of my Address before its delivery.

The essential substance of Senator Capper's resolution is contained in the paragraph which reads as follows :—

> " That whenever the President determines and by proclamation declares that any country has violated the Multilateral Treaty for the Renunciation of War,

it shall be unlawful, unless otherwise provided by act of Congress, or by proclamation of the President, to export to such country arms, munitions, implements of war or other articles for use in war until the President shall by proclamation declare that such violation no longer continues."

There is obviously an important difference between our two proposals, which will be recognisable from the remarks made earlier in this lecture regarding the similarity which has recently developed between the nature of civil supplies and munitions of war; there is the circumstance, too, that some *materials* which are essential for one purpose can be converted to *articles* that are required for the other. Indeed, Senator Capper leaves us with the old difficulty of defining "munitions of war," of distinguishing between "contraband" and "conditional contraband." His resolution also, although in this way wider, covers less ground than my proposed amendment, because it permits the export of articles which are obviously not for use in war in their exported form, but which, when made of metal, can readily be converted to war use, even as lethal weapons. "Plowshares" made of nickel-steel and "pruning hooks" of the tungsten alloy will be in great demand when required to reverse the ancient prophecy of universal peace, a prophecy which was similarly made independently by two prophets long before ferro-alloys and high explosives were dreamt of.

I have accordingly suggested an amendment to the Capper resolution, using the simple words "mineral products" as sufficient when controlled to stop a war if already started; and, because of its minatory form, sufficient effectively to restrain any nation that may be tempted to disregard its treaty obligations. All lethal munitions that one could think of as possible are wholly, or mainly composed of "mineral products" in some form. A closer scrutiny of the list might even narrow the prohibition to a relatively short list of metals and other mineral products; still, as international agreements are slow to make and equally difficult to rectify, it is better to accept the crude comprehensive group as a rider that is sufficiently wide to be effective, but yet restricted enough to reduce so far as is safe that degree of disturbance to commerce and finance which may tend to widen the area of dispute.

THE HURLEY SCHEME

During the past two months a third proposal of the same generic type has been made by Mr. Edward N. Hurley, of Chicago, in a letter, dated 20th November, 1929, addressed to the President of the International Chamber of Commerce. Mr. Hurley outlines a "plan for the permanent abatement of warfare among nations through the control of the raw materials without which modern wars cannot be carried on." He points out that "any modern nation could be paralysed by the refusal of business organisations in the other countries to sell to it ten or twelve essential raw materials, such as iron-ore, rubber, manganese, nickel, aluminium, newsprint pulp, copper, oils, tungsten, chromium and mercury."

This list of eleven examples of "essential" raw materials significantly includes nine mineral products; and of the other two, rubber, not being a mineral, is threatened with a synthetic substitute, whilst judicious restriction of the one remaining substance might even be imposed advantageously for the more peaceful enjoyment of peace. Mr. Hurley tells me that he failed to notice till last month that a similar proposal was made in my Address to the British Association. The copy of his letter now received shows that he has been independently following the same line of thought; but, instead of asking the governments to sign an agreement, he suggests that an understanding among leaders of commerce would provide an effective restraint of martial fervour; and, with this object in view, he wishes his proposals to be discussed at the next international meeting of the Chambers of Commerce. The fact that an agreement among the leading producers of raw materials could be supported also by other commercial leaders who are controllers of transport and finance may tend to reduce possibly to an effective degree some of the efforts of any lineal descendant of "bootleggers" who are likely to be incubated in a warm war atmosphere.

Whether any such agreement among leaders of commerce and industry can be effected must be left to the Chambers of Commerce to decide, but it is clear that Mr. Hurley has discovered independently a method essentially similar in nature to that which I have attempted to describe. Obviously, a self-denying ordinance among the limited class of capitalists will be regarded with less confidence than treaty obligations made by responsible Governments. There is also a danger that a measure designed to paralyse the financial operations of a nation and to refuse transport facilities may lose in value, and even fail in operation, because it goes too far by striking at common civil necessities. If the car can be immobilised by the removal of its replaceable sparking plugs, there is no necessity to empty the petrol tanks and to puncture the tyres as well.

SUMMARY

It is necessary to recognise the circumstance that the principal mineral deposits are distributed in the earth's crust over areas that do not coincide with the established national boundary lines.

During the past few years the use of metals and of other mineral products which followed the mechanisation of industries has enormously increased in variety and in quantity, with the result that no industrial country is now self-contained, and the national interchange of mineral products is inevitable.

As this national interdependence for minerals tends to increase, our fiscal relationships should be adjusted for the general benefit of civilised communities and for the purpose of reducing the causes of international friction.

These considerations have been urged especially by Professor Leith in the United States; and the chief object of this paper is to propose that advantage be taken of the situation as a means for enforcing the recently-developed international understandings and treaties designed to renounce war as an instrument of international policy.

It is obvious that if the Arts of Peace necessitate the international movements

TABLE.

Average annual production of some leading minerals for the years 1926– 28, quoted to show the dominating producers.

	World's Total.	Country	Output.	Per Cent. of World's Total.
Antimony ..	*tons*	China	21,000	65.5
	32,000	Bolivia ..	3,909	12.2
Asbestos	*tons* 363,000	British Empire	332,000	90.7
Chromite ..	*tons*	British Empire	250,000	63.0
	397,000	S. Rhodesia ..	184,119	46.4
Copper	*tons*	U.S.A... ..	780,600	50.1
	1,557,000	British Empire	113,000	7.2
		Japan	66,628	4.3
Gold	*ounces* 19,300,000	S. African Union ..	10,143,839	52.6
Pig-iron (1927, 1928) ..	*tons* 86,400,000	U.S.A.. ..	37,360,680	78.0
		Germany ..	12,249,987	
		France ..	9,474,956	
		Gt. Britain ..	6,951,500	
		Canada ..	924,480	
Lead	*tons* 1,983,000	U.S.A.. .	583,309	29.4
Manganese-ore (1926, 1927) ..	*tons* 3,900,000	India ..	1,072,140	37.6
		Gold Coast ..	392,883	
Nickel	*tons* 37,700	Canada ..	34,117	90.5
Petroleum ..	*tons* 167,467,000	U.S.A... ..	115,922,404	69.0
Potash	*tons* 1,880,000	Germany ..	1,401,269	94.0
		France ..	377,289	
Quicksilver (1927)	*lbs.* 11,000,000	Spain	5,496,121	50.0
		Italy	4,400,426	40.0
Tin	*tons*	British Empire	73,133	45.7
	160,000	Malaya ..	55,524	34.3
Zinc	*tons*	U.S.A... ..	649,079	39.3
	1,650,000	British Empire	325,300	19.7

of minerals, modern warfare cannot be conducted without even greater quantities and wider varieties of such products. To accumulate stocks in anticipation of a war is shown to be impracticable. It is therefore proposed that all nations that have signed the Kellogg-Briand Pact of Paris should be invited to add a rider, giving the Government of each the authority, if and when necessary, to prohibit the export of mineral products to any nation that violates the multilateral treaty.

The scheme could be initiated by agreement between the British Empire and the United States, which between them own some two-thirds of the known workable deposits of minerals and commercially control some three-quarters.

Any such agreement would effectually stop a war if rashly commenced; and because of its minatory spirit, would enforce a more general consideration of the peaceful means for settlement which are provided by the Council of the League of Nations and International Court of Justice.

The plan proposed would not interfere with the general conditions of international commerce and finance, except as regards mineral products betwen the rest of the signatories of the Pact of Paris and the pact-breaking nation ; for re-export would not be possible from those that are loyal to the treaty. It would not interfere with the trade required for the civil necessities of any nation, and thus would reduce to a minimum the aftermath of reparation disputes. In this respect it evades the dangers which are inherent in Article XVI of the Covenant of the League of Nations.

It is hoped that any agreement of the kind will facilitate measures for reducing armaments and other conditions that now retard the development of a national policy towards peace, a policy which should be logically an obligation following the recent general declaration of good intentions to eschew war. The problem of reducing armaments would become more readily soluble if we could first be absolutely sure of security. The Powers could then discuss the question in a wholly different atmosphere. Each would then be free to recognise that the others have unlike responsibilities in distant parts of the World, where the League of Nations is not recognised and where the Kellogg Pact is regarded as an immoral interference with a recognised form of sport. Parity of armaments at home is not mathematically correct until the tonnage or other accepted unit of measurement be divided by the unit of responsibility for geographically distant obligations.

DISCUSSION

THE CHAIRMAN said that he thought it would be agreed that in alluding to Sir Thomas Holland's work on the Munitions Board in India at the beginning of the meeting, he had been quite right in his deductions as to Sir Thomas Holland's qualifications. He was confident that no man could have given the lecture of that evening unless he had been most intimately connected with the output of munitions. He felt that the Society must be extremely grateful to Sir Thomas Holland for such a very suggestive lecture. Sir Thomas had already broached this subject in his address as President of the British Association at its meeting in South Africa, and he had mentioned that evening a remark made by General Smuts, which was made in

Johannesburg in the course of a speech moving a vote of thanks to Sir Thomas for his Presidential Address. In the lecture just delivered, Sir Thomas Holland had put in a more succinct form the argument contained in the address which he delivered at Johannesburg. Put shortly, it came to this, that in place of the so-called economic sanctions of Article XVI of the Covenant of the League of Nations, something in the nature of a "mineral sanction" should be substituted. He could himself well recollect when the Protocol was under discussion at Geneva in 1924, and he happened to be at the Admiralty, what grave concern was felt there with regard to the economic sanctions under Article XVI, and the responsibility which it was felt might be placed upon the British Navy in the attempt to enforce those sanctions. He was not at all unfamiliar, therefore, with the criticisms which Sir Thomas Holland had uttered with regard to the economic sanctions. The mineral sanction, as he had stated, was so very simple that one almost suspected there must be a catch in it somewhere. He hoped that was not the case, and that the proposal which Sir Thomas Holland had made would not remain merely in the text of a lecture published in the *Journal* of the Royal Society of Arts, but would find some practical fulfilment. Sir Thomas Holland had mentioned in the course of his lecture a speech delivered by Viscount Grey of Fallodon at the Pilgrims' Dinner to the delegates to the Naval Five Power Conference the previous evening. He would also like to recall something that Lord Grey had said on that occasion. Lord Grey remarked that human ideals passed through four phases. First of all there was the phase in which an ideal was regarded as so visionary and remote that no statesman would think it worthy of practical consideration. Secondly, it became a possibility; thirdly, a probability, and fourthly, and finally, there was the phase in which it was regarded as a matter of course. He hoped that Sir Thomas Holland's proposal had passed out of that first stage of something to be so visionary and remote as not to be worthy of the consideration of statesmen, and that General Smuts's imprimatur had brought it at least into the second phase, where it might be regarded as a possibility. As he understood from Sir Thomas that General Smuts was deeply interested in this proposal, he trusted that it might go on to the third and fourth phases he had mentioned.

Sir Thomas Holland, who had travelled down from Scotland the previous night in order to deliver his lecture, was going again to catch the night train to Edinburgh, and therefore the audience must not detain him. He was a man under authority, and he had many meetings to attend on the morrow. He proposed a vote of thanks to Sir Thomas Holland for his lecture

SIR REGINALD MANT having formally seconded the proposal, the vote of thanks was carried unanimously.

SIR THOMAS HOLLAND, in reply, after acknowledging the compliment, and saying how pleased he was with the cordial reception of his lecture, added that he thought the time had come to look at the problems of peace, not from the point of view of enforcing it by military or naval action, but from the other point of view, which he had elaborated in his lecture, of prevention. It was the duty of everyone who had any kind of specialised knowledge to endeavour to turn it to account in order to promote the great issue of peace. His own proposal might in the result be far from fulfilling the hopes he had sketched for it, but so far as it was worthy, it was for the public to consider its merits, and if a better scheme could be worked out by consultation, so much to the good. What he wanted to see was a practical scheme, not merely for reducing armaments, but for making the reduction of armaments an easy matter, and not, as it was at present, a matter of very great difficulty.

The proceedings then terminated.

NOTES ON BOOKS

APPLIED AERIAL PHOTOGRAPHY. By Captain McKinley. New York: John Wiley and Sons. London: Chapman and Hall, Ltd. 25*s*.

This book is a useful addition to the existing works on the subject of the taking and finishing of aerial photographs, and is evidently written from the result of practical experience in these matters.

In dealing with the duties of the crew of a photographic aeroplane, the author considers that a photographer is essential. A camera operator should certainly be carried as a general principle in addition to the pilot, and should have a sound knowledge of air navigation, but the duties of operating and adjusting the camera can easily be learnt in a very short time.

The necessity for flying straight and level and at a constant altitude above ground during the exposure of photographic strips is referred to in the following terms: " the impression is quite common that it should be rather easy to fly vertically over a ground course between two predetermined points. This fallacy is held not alone by the layman, but is surprisingly prevalent amongst skilful pilots who have not flown photographic machines at high altitudes." It is not unreasonable for experienced pilots who are constantly flying from place to place and invariably arriving at their destination to think that this task of photographic strip flying is indeed quite a simple matter; they should, however, undertake a trial run before expressing too much confidence in their ability to do so. The problem of covering large areas with photographic strips varies with the particular type of country, and will become more difficult over featureless land such as desert or dense forest. This point should be borne in mind when reading the routine for such flights given in Chapter I, remembering that this routine can only provide a general basis on which to work.

More could have been said about the effect of air haze and the use of filters, since air photography is more hampered by the effect of haze than by any other factor. It is probable that the difficulty does not arise to such an extent in the clear atmosphere of the United States as it does in the hazy atmosphere of Europe.

A very useful chapter has been devoted to air cameras; the characteristics of the various types with which the author is familiar, together with their installation, being described in some detail. Captain McKinley favours the hand-operated type and considers that the automatic and semi-automatic camera is of little value, if any, for peace-time mapping. It is to be supposed that his experience of automatic cameras has been particularly unfortunate. Hand operation may indeed be necessary on occasions, but only as an addition to an automatic control. Either system should be capable of independent operation.

A general specification of requirements for photographic aircraft is given at some length. An aeroplane which conforms to this general specification would undoubtedly be most valuable, but the author would appear to be a little ambitious in this respect.

The chapters on the lens, developing, printing, copying, etc., are complete and useful, although they do not deviate to any great extent from normal photographic practice.

Part III of the book deals with mapping "with or from the photographs," including chapters on the general aspects of mapping and the use of maps. On these questions the author would not appear to have had much experience, and his conclusions thereon are of little value. He states, for instance, that " an aerial photographic mosaic," if controlled by certain survey data, " can for practical purposes be made as accurately as a line-drawn map." This statement is made without due regard to the various purposes to which maps on different scales are put, and does not appear to be supported by any very clear ideas as to the limitations of the photo mosaic. Although the author is aware, for instance, of the effect of tilt and variations in ground elevation on the accuracy of photographic positions, he nowhere states clearly the extent to which these factors would modify his above conclusion in particular circumstances.

Detailed instructions are given for compiling mosaics, and if the reader is content to consider the question of the mosaic as entirely distinct from the problem of the map, he will find these instructions most valuable.

A clear description of the Deville methods of survey from oblique photographs is supplied by Mr. A. M. Narraway, of the Canadian Surveys. This description embodies the latest practice in operation by the Topographical Surveys of Canada.

F.C.V.L. AND M.H.

QUEEN CHARLOTTE'S LOAN EXHIBITION OF OLD SILVER. Privately printed at the Saint Catherine Press.

This descriptive and illustrated catalogue commemorates the exhibition which was held in May and June, 1929, at Seaford House. The exhibits were either examples of English, Irish and Scottish work done prior to 1739, or at the present day. A considerable sum of money was raised for Queen Charlotte's Maternity Hospital and the National Mother-Saving Campaign.

In his introduction to the modern section, Mr. G. R. Hughes explains the sad decay which overtook silverwork in the last half of the nineteenth century: " . . . the dual demand of size and weight, combined with cut prices, rushed the artist's vitality out of him." It is as shocking to think of a silversmith working by cost per ounce as of Constable painting by the square foot.

In the Middle Ages, as Mr. Hughes reminds us, and also of course at the time of the Renaissance, the goldsmith's and silversmith's workshop was a training ground for artists. The position seems rather to have been reversed, and to-day the silversmiths are " looking outside as well as inside their own ranks for ideas in design." Mr. Hughes comments on " the monotonous similarity of the average sports trophy," but it seems as if even a sculptor must find it hard to produce anything very significant in this line: the R.A.C. trophy, plate XIII, falls between the two stools of nature and art.

Plate X shows an agreeable cocktail-shaker, about which Mr. Hughes says that it is interesting to see how it fulfils " the primary artistic requirement of suitability for purpose." The modern campaign to prove that beauty is not beauty but usefulness grows daily more intensive ! Do many people really go to the Italian Exhibition at the Royal Academy in order the better to understand their Scriptures ?

The modern pieces illustrated are almost uniformly attractive in a chaste and dignified way. One may doubt whether the engravings on the Hunt cup and the Arts Club cup are an improvement on the plain design.

The sixty-five plates which show old silver embrace a wide range of subject and ideas. Mr. Watts and Mr. Shirley have written an excellent introduction to this section, in which historical notes and comments on the illustrations are interestingly combined. If cocktails are providing the twentieth century with a new idea they are doing what tea, coffee and chocolate did for the seventeenth. Tea, being a " Chinean drink," was first appropriately served in Oriental porcelain pots. Coffee, we learn, was drunk in the Common Room of Balliol College during the Commonwealth. But no less important for the silversmith than the appearance of these beverages was the immigration of French Huguenot craftsmen after the Revocation of the Edict of Nantes. What the western European nations have in common, and not in art only, is enormously more important than the differences between them.

THE CHANNEL TUNNEL PROJECT : A BRIEF HISTORY. By Reginald Arthur Ryves. London : B. T. Batsford, Ltd. 2s. 6d.

The author, in a book consisting of 58 pages with a few plates, gives a fund of well-selected information, which, at the present time, will be acceptable not only to the civil engineer, but also to the general reader.

Schemes for cross-channel railway communication, whether tunnel in its full aspect of depth below sea-bottom, submerged tube, ferry, or bridge, are considered, except a few that are so erratic as to be unworthy of notice, and two pre-railway projects.

Chapter I, a historical summary, commences with the scheme put forward by the Frenchman Mathieu at the close of the eighteenth century, but only brought into general notice in 1802, when Napoleon I (then First Consul) expressed approval.

Twelve projects, from 1834 to 1862, are touched upon lightly but sufficiently on pp. 10-11 ; next we come to William Low's project (1867) of a twin tunnel system—a scheme which, as regards leading features, has dominated since in relation to cross-Channel projects, and is now regarded as the basis of any satisfactory outcome ; a careful description and study of Low's project being the staple of the after part of the book. Much which at first sight may appear to stand in rivalry with Low's scheme is put out of court, in the short but important chapter, "Why Some Schemes are Ruled Out," pp. 15-21.

Brunel's earlier study of twin tunnels with cross connections is exemplified by the Thames Tunnel between Rotherhithe and Wapping, which was opened for foot passenger traffic in 1843, after various mishaps and departures from the original plans. Low, however, was probably the first to make full plans and to indicate a direct course for constructing such a tunnel. If we open the folding plan which the author gives at p. 41, we shall see that the cross-passages in Low's system are much longer than those of Brunel's. Shortening Low's cross-passages and adopting Brunel's compactness may possibly prove advantageous on the score of strength and a much diminished outer surface.

All interested in the Channel railway scheme should read Mr. Ryves's book.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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MONDAY FEBRUARY 17 Architects, Royal Institute of British, 9 Conduit Street, W 8 p m Prof P Abercrombie "The Thames Valley Preservation Scheme"

Electrical Engineers, Institution of, Savoy Place, W C 7 p m Discussion on (1) "The Nickel-Iron Battery and its Uses," opened by Mr M L Fox and Mr W J Wamlow (2) "The Lead Battery and its Uses," opened by Mr L C McKinnon

At the University, Liverpool 7 30 p m Captain P P Eckersley, "Broadcasting by Electric Waves" (Faraday Lecture)

Geographical Society, Lowther Lodge, Kensington Gore, S W 5 p m Lt-Col R C F Schomberg, "Climatic Conditions in the Tarim-Basin"

Mechanical Engineers, Institution of, Storey's Gate, S W 7 p m Mr W W S Robertson, "Strip Rolling Mills and Auxiliary Machinery"

University of London, at King's College, Strand, W C 5 30 p m Prof R W. Seton-Watson, "Outlines of British Foreign Policy (1815-80) Lecture V The Crimean War and the Concert of Europe"

At University College, Gower Street, W C 5 30 p m Prof J W Mackail, "The Approach to Shakespeare" (Lecture V)

Victoria Institute at the Central Hall, Westminster, S W 4 30 p m Brig-General H Biddulph, "The Date of Ecclesiasticus

TUESDAY FEBRUARY 18 Automobile Engineers, Institution of, at the Engineering and Scientific Club, Wolverhampton 7 30 p m Mr J H Pomeroy "The Double-Six Engine"

East India Association, at Caxton Hall Westminster, S W 4 30 p m The Right Rev Bishop Palmer, D D, "Recent Developments in the Churches in India"

Electrical Engineers, Institution of at the Engineers' Club, Manchester 7 p m Messrs J G Wellings and C G Mayo, "Instrument Transformers"

Heating and Ventilating Engineers, Institution of, at Milton Hall, Manchester 7 p m Mr F C Lant, "Kitchen Equipment"

Illuminating Engineering Society, at 15 Savoy Street, Strand, W C 6 30 p m Mr W Villiers, "Modern Incandescent Lighting in Kinema Studios"

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds 7 30 p m Joint Meeting with Graduates' Section of Institution of Electrical Engineers

Photographic Society 35 Russell Square WC 7 pm Ordinary Meeting

Royal Institution 21 Albemarle Street W 5 15 pm Sir William Bragg X Ray Determination of the Structure of Cellulose (Lecture II)

Statistical Society at the Royal Society of Arts Adelphi WC 5 15 pm Professor Dr M Greenwood The Vaccination Problem

University of London at Kings College Strand WC 5 30 pm Mr C W Marshall Electrical Transmission by Overhead Lines (Lecture II)

At Kings College Strand WC 5 30 pm Prof Sir B Pares Russian History from Peter the Great to 1861 Lecture V Catherine Poland and Europe

Kings College at 40 Torrington Square WC 5 3 pm Dr J Krzyzanowski Two Modern Polish Novelists Lecture III—The Realist Novels of W S Reymont

At University College Gower Street WC 8 15 pm Miss L J Davis How London Became the Capital of England (Lecture V)

Zoological Society Regent's Park NW 5 30 pm Scientific Business Meetin

Wednesday February 19 Aeronautical Society at the Institution of Electrical Engineers Savoy Place WC 6 30 pm Dr Walter Georgii Gliding

Civil Engineers Institution of Great George Street SW 6 3 pm

Electrical Engineers Institution of at the Royal Victoria Hotel Sheffield 30 pm Colonel Sir T F Purves Presidential Address

Meteorological Society 49 Cromwell Road SW 5 pm (1) Dr G C Simpson The Distribution of Terrestrial Radiation (2) Mr C K M Douglas The Cyclonic Depressions of November 16 and 23 1928

Microscopical Society 20 Hanover Square W 8 pm (1) Dr Reginald S Clay and Mr Thomas H Court Early Achromatic Microscopes by James Smith (2) Mr D V Duran (1) Coincident Images made use of in Mycological and Bacteriological Works with Reference to Single Spore Culture (2) Reflection Magnification used for Physiological Experiments connected with Trans[illegible] (3) A Note on Illuminating Objects for Microscopical Examination

United Service Institution Whitehall SW 3 pm Captain R St P Parry The Navy in the Persian Gulf

University of London at Kings College Strand WC 5 15 pm Mr C H Driver, The Social and Political Ideas of some Representative Thinkers of the Revolutionary Era Lecture VI William Godwin

At Kings College Strand WC 5 30 pm Mr A F Meyendorff The Russian Autocracy its Structure and Characteristic Features (Lecture I)

At University College Gower Street WC 3 pm Dr C Pellizzi La Lirica del Paradiso (Lecture V)

At University College Gower Street WC 5 pm Dr R J Ludford Cytology in Relation to Physiology and Pathology (Lecture III)

Thursday February 20 Chemical Society Burlington House W 8 pm (1) Messrs T M Lowry and G Jessop The Properties of the Chlorides of Sulphur Part III Dielectric Constants (2) Messrs T M Lowry and G Jessop The Properties of the Chlorides of Sulphur Part IV Density and Surface Tension (3) Messrs G A C Gough and H King Trypanocidal Action and Chemical Constitution Part IX Aromatic Arsinic Acids Containing an Amide Group

Dyers and Colourists Society of (Manchester Section) Prof McSwiney The Problem of the Fastness of Dyes to Perspiration

Electrical Engineers Institution of at Trinity College Dublin 7 45 pm Messrs B A G Churcher and A J King The Analysis and Measurement of the Noise Emitted by Machinery

Linnean Society Burlington House W 5 pm

Mechanical Engineers, Institution of at the Queen's Hotel Birmingham 6 30 pm Chairman's Address At the Engineers Club Manchester 7 15 pm Sixth Report of the Steam Nozzles Research Committee

Patentees Institute of at Caxton Hall, Westminster, SW 8 pm Prof A M Low, Scientist Looks at Spiritualism

Photographic Society 35 Russell Square WC 7 pm Meeting of Kinematograph Group

Royal Institution 21 Albemarle Street W 5 15 pm Mr T A Joyce Architecture and the Industrial Arts of pre Spanish America (Lecture II)

University of London at Bedford College for Women Regents Park NW 5 15 pm Mr M Browne The True Story of Journey's End

At Kings College Strand WC 5 30 pm Monsieur G Lafourcade Baudelaire ses Origines Littéraires son Influence (Lecture I)

At Kings College Strand WC 5 30 pm Prof R J S McDowall The Control of the Circulation (Lecture IV)

At Kings College Strand WC 5 30 pm Mr H W Steed Masaryk and Central Europe Lecture I—The Man and the Teacher

At University College Gower Street WC 5 15 pm Prof J E G de Montmorency Momentous Law Suits and Trials in Various Countries from Classical to Modern Times (Lecture IV)

At University College Gower Street WC 5 30 pm Mr A D Lindsay The Relations between Ethics Economics and Politics (Lecture IV)

At University College Gower Street WC 5 30 pm Prof J W Mackail The Approach to Shakespeare (Lecture VI)

Victoria and Albert Museum South Kensington SW 5 3 pm Mr H Clifford Smith Italian Furniture

Friday February 21 Electrical Development Association British at the Royal Society of Arts Adelphi WC 7 30 pm Mr C H Flower The Electrical Industry and the Architect

Geological Society Burlington House W 3 pm Annual General Meeting Prof Dr J W Gregory Presidential Address

Junior Institution of Engineers 39 Victoria Street SW 7 30 pm Mr E I S Gardner The Application of Electric Welding to the Erection and Strengthening of Steel Structures

London Society at the Royal Society of Arts Adelphi WC 5 pm Sir Frank Dyson The Royal Observatory Greenwich

Mechanical Engineers Institution of Storey's Gate SW 6 pm Annual General Meeting Discussion on the Sixth Report of the Steam Nozzles Research Committee

North East Coast Institution of Engineers and Shipbuilders at the Mining Institute Newcastle-on Tyne 6 pm Rear Admiral W Scott Hill Powdered Coal for Ship Propulsion

Photographic Society 35 Russell Square WC 7 pm Meeting of Pictorial Group

Royal Institution 21 Albemarle Street W 9 pm Mr J B S Haldane Principles of Plant Breeding

University of London at the London School of Economics Houghton Street WC 5 pm Mr R G Hawtrey The Relation of International Trade to Wages (Lecture I)

At Kings College Strand WC 5 30 pm Prince D S Mirsky Russian Literary Criticism Lecture VI—The Science of Literature and the Revival of Aestheticism (1860 1920)

At Kings College Strand WC 5 30 pm Rt Hon Sir R Rodd Survivals of Ancient Myth in Modern Greek Folklore

At University College Gower Street WC 5 pm Mr G P Wells Comparative Physiology (Lecture VI)

At University College Gower Street WC 5 30 pm Prof P Flemming The Infirmary of the Medieval Monastery with special reference to the Abbey of Westminster

Saturday February 22 LCC Horniman Museum Forest Hill SE 3 30 pm Miss I D Thornley Sanctuary in the Middle Ages

Royal Institution 21 Albemarle Street, W 3 pm Mr W Rothenstein, ' 19th Century Painting in France and England

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4031 FRIDAY, FEBRUARY 21st, 1930 VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

England.

> " *The conception in my mind is that of an old and isolated people, developing, by the slow mingling and attrition of their ideas, and needs, and impulses, a certain deeply-lying unity which becomes a kind of ' instinct ' for national life, and gives to national policy, without the conscious knowledge of any individual citizen, without the direction of statesmen, and perhaps in spite of them all, a continuity of trend, and even an intelligence, by which events may be influenced in a profoundly important way.*"
>
> *W. Trotter.*

Dorchester House.—Mr. D. S. McColl's lecture on the work of Alfred Stevens will appear in an early issue of the *Journal.* We have already referred to Mr. McColl's long and notable connection with the World of Art in England, and it is interesting that his first public appearance, after his retirement from the Fine Arts Commission, should be at a lecture on this subject. Alfred Stevens was a very complete and all-round artist—architect, sculptor, painter—and a good deal of his work was enshrined in the now-destroyed Dorchester House, Park Lane. It is surely a very suitable time to call attention to his work when the new hotel, which is to be built on this site, is a matter of so much controversy. The battle of the architectural and engineering mind, it seems, is to be fought here with some violence. It was thought that the note of the future architectural amenities of Park Lane in the matter of design and materials had been set by the Duke of Westminster's advisers, and, in particular, by the doyen of English architecture, Sir Edwin Lutyens. Apparently the directors of the new hotel are determined not to fall into line with the Duke's advisers. It is an interesting question how far the owners of a particular site in a street should be allowed to assert themselves at the expense of their surroundings. We are not weeping over the departure of the old-fashioned mansion, much as we may sentimentally regret this. With the arrival of the mammoth Grosvenor House Hotel it was inevitable that the whole thoroughfare would soon become a continuous line of high buildings. If the requirements of space have to be met by buildings of these dimensions, there surely is no thoroughfare in London where they could be more suitably built if some ordered and properly related architecture were associated with the change. Red brick evidently was considered the most suitable material for the manner of the design, and whether this was a right decision the Grosvenor House Hotel dominates Park Lane so completely, that it is difficult to see a sudden interruption at South Street in a building built entirely of concrete. In any case, concrete in the London atmosphere, even if the surface is treated as in the new Carreras building, soon has a tired and dismal appearance. We suggest that such experiments in new building materials would be better made in entirely new thoroughfares.

Inns.—We quote the following from *The Observer* :

> " It is rather good news that the Automobile Association withdrew its imprimatur from fifty hotels last year for unsatisfactory catering. The art of inn-keeping is in sore need of stimulus, and the displeasure of the A.A. is probably the most direct and effective ' sanction ' that we have available. The country inn that, instead of home-made scones, desolates its tea-tables with the ' pastries ' of London tea-shops, ought not to have more than one warning."

This Society has a considerable problem to face in regard to its Inns at West Wycombe. It certainly is good news that the Automobile Association realises its responsibilities to travellers, and it is time the English inns should be called upon to supply refreshment as well as drink in agreeable surroundings. We shall be grateful to the Automobile Association for their assistance at West Wycombe in order that, here, at least, the traveller between London and Oxford may be sure of getting the right sort of hospitality.

Poole Harbour.—We are glad to see that the opposition to the proposed bridge increases in volume. The Dorset County Council have decided to lodge an appeal against the Bill. At a meeting in Dorchester, Lord Ilchester said :—" The bridge would have to be a very high structure so as not to interfere with shipping, and, they would all agree, would be a terrible eyesore to that part of the country. The Isle of Purbeck was one of the most beautiful spots they had left in the county, and to open it up in this way, when there was a perfectly good ferry there already, seemed to them very undesirable." Lord Shaftesbury, who was in the Chair, informed the press that a recommendation to lodge a petition in Parliament had been agreed to. Will the Bournemouth-Swanage Motor, Road and Ferry Company, produce a model of their proposals in exact relation to the site ? Mr. John W. Cogswell, the secretary, says that bridges may possibly have to be unsightly for the sake of progress, " but this bridge will make practically no difference to the landscape." Will he favour this Society with at least a picture of this unique bridge ? It was also decided to oppose the proposition by the Bournemouth Corporation to incorporate the rapidly developing Kinson area into the Borough of Bournemouth. It is good to think that the Mayor of Bournemouth will have some opposition to his Council's desire to extend their "unsurpassed Garden City" any further.

The Slade Professor of Fine Art at Oxford University writes to us as follows:—

> "May I express my hearty support of any efforts the R.S.A. are making to defeat the project of building a bridge across the entrance to Poole Harbour? I write thus because it seems that my satirical letter in *The Times* last week has not made clear my strong opposition to the scheme."

(Since this was written we understand the bill has been thrown out. This is another triumph for the influence of educated public opinion).

Ladies and the Royal Society of Arts. In connection with Lady (Austen) Chamberlain's visit to the Society's rooms to take the chair at Mr. Constable's lecture on Italian Art, it is interesting to note that from the first foundation of the Society, ladies have been eligible for membership and the list of members has always contained the names of many distinguished women. We recall also that a very important service rendered by the Society to the promotion of the Fine Arts in England was the establishment of periodical exhibitions of the works of contemporary artists, since it was directly as a consequence of those exhibitions that the Royal Academy was founded. The Society, therefore, may legitimately claim to have been not only the precursor of the Academy, but the original source from which this great exhibition was developed.

Heirloom Furniture Sale taking place at Christie's and Sotheby's this Week.- The sale of the now famous MSS, The Luttrell Psalter and Bedford Hours, which unless £63,000 are found will follow the procession of national treasures out of the country, provides a salutary warning to these numerous owners of family treasures who wish them to be heirlooms and inseparable from the residence of the successors to the family estates.

These MSS with family pictures (from 1590), furniture, etc , were made heirlooms by a Deed of Settlement " for the use and benefit of the person or persons " who for the time being shall be entitled to the Castle and Manors and other " hereditaments hereby settled under or by virtue of the limitations thereof herein- " before contained to the intent that the same may be enjoyed as heirlooms and go " along with the said Castle and hereditaments hereby settled," with a further provision (to show clearly the object of the Settlors), that the severe penalty of giving up the Estate to the next in succession should be incurred in case of the owner in possession not making the Castle " a principal place of Residence." A legal pitfall, however, upset the intention of the Settlors owing to the existence of a rule of law under which the tenant in tail that first attained the age of 21 years inherited such chattels. This tenant in tail happened to be a young man who died with three lives between him and the enjoyment of the property. He made a will leaving to his wife all he possessed, without knowing anything of his interest in these valuable MSS and chattels. The Courts have decided that the heirlooms became the property of this tenant in tail, although he never succeeded to the Estate, and all the heirlooms including the two MSS pass away from the family and the family residence is stripped of its treasures and furniture. The law has been fortunately amended since 1925, and it is important for all those who wish to provide against the disaster which has occurred in this case to follow carefully the provisions of the new law.

There are many similar cases of such reversal of settlements on which this last judgment is founded. Apart from the confiscatory estate duties imposed by successive Governments, which have been the principal agents in the disastrous loss of national treasures to the country, these interesting MSS might have remained as hitherto on loan to the British Museum for the enjoyment of art lovers and the nation.

Among the printed books which are to be sold by Messrs. Sotheby on March 3rd is a perfect copy of Wynkyn de Worde's Chastising of God's Children (1492)—an extremely rare book. Of the copies recorded by Duff, only two were in private libraries, the Huth copy (sold in 1912), and the copy in the library at Chatsworth. There is also a presentation copy of Davenant's Gondibert (1651).

Goodwood Beeches. The Duke of Richmond and Gordon writes as follows, in reply to a letter addressed to him by the Society on this subject:

> " While I quite realise and appreciate the feelings of your Society upon this matter, may I direct your attention to the article in *The Times* of February 2nd, from which you will realise the true position, which has, I think, been *very* largely exaggerated by the Press."

"SALE OF GOODWOOD BEECHES

70,000 IN ONE LOT

TOLL OF DEATH DUTIES

(From Our Special Correspondent)

GOODWOOD, FEB. 6.

Taxation on the passing at death of landed property takes a heavy toll of the English woodlands. In the dining-room of a pleasant hotel near Chichester this afternoon, more than 70,000 fine beech trees standing erect and tall on outlying parts of the Duke of Richmond and Gordon's estate at Goodwood, were sold for clearance for a sum of £45,000. The auctioneer, Mr. Stops, of Messrs. Jackson Stops, announced that the sale was due to special conditions with which taxpayers would sympathise. The eighth Duke, who succeeded his father in 1928, has to meet Death Duties.

The trees to be cut were probably planted under the guidance of the third Duke of Richmond, who greatly increased the extent of the Goodwood property by the purchase of land at Westhampnett, Lavant, Stoke, Singleton, East Dean, and Selhurst Park and gave his attention to trees before he began to build. Foresters put the age of some of the beeches to be felled at nearly two centuries. The sale to-day is believed to be the largest of its kind which has ever been arranged in this country. It lasted less than a quarter of an hour.

Prospective buyers had come from France, Belgium, the Irish Free State, and all parts of the United Kingdom. At 2 o'clock they were crowded in a room with an open fireplace and walls decorated with an original wood-block print, which has been untouched and unrepaired for 90 years. Mr. Stops described the occasion as a special one, and, after stating the reasons for the sale, answered criticism which had been directed at the throwing of so much timber on the market at one time by saying that the Duke's hand had been forced by the circumstances of his position. He added that with a small exclusion, he proposed to submit the timber, amounting to nearly 2,240,000 cubic feet, in one lot. This offered a marvellous opportunity, as the buyer could move the timber as he liked, and save transport congestion. Although the Duke wished to forget about the sale and to replant, the time for removal had been extended to eight years.

Bidding began at £25,000, and was raised by advances of £5,000 to £40,000 Four increases of £1,000 each followed, and then two of £500 each, bringing the amount offered up to £45,000. Mr. Stops announced that at this figure the timber was on an open market, and at about 5d. a foot offered the opportunity of a lifetime. There was, however, no further bid, and the trees were sold to Messrs. J. H. and F. W. Green, of Chesterfield. A separate lot, consisting of 107 oaks and 15 other trees on ground adjoining the main road from the racecourse to Chichester, was afterwards knocked down for the substantial price of £600.

VIEW FROM RACECOURSE

While the disposal of so much timber must be regretted, it is claimed that the selection of the areas to be cleared will cause a minimum of interference with the beauties of the country around Goodwood. All the timber is matured, and would have come down in rotation as the market offered opportunities. Inevitable felling has only been anticipated by the sale. Visitors to the racecourse in coming years will see little change in a delightful landscape. Two plots near to the course are to be cleared only to a limited extent, and the fringes of woodland left will conceal the denuded acres. The other beech woods to be cut are, for the most part, two miles distant from the grand stand, and where they rise to the skyline they are seen only as a belt of colour which will change its tone as the timber is removed. A large section of Charlton Forest has, in fact, already been cleared, and the effect of the disappearance of the trees is to be noted only in the setting of a patch of brown beside and below a winter stretch of grey.

The sale does not touch the more remarkable trees of Goodwood, the cedars, cork oaks, tulips, and chestnuts. The third Duke of Richmond, in 1760 and the following year, planted 1,000 four-year-old cedars of Lebanon, obtained for him by Peter Collinson, the noted botanist and horticulturist. Not more than 100 of these remain to-day. The gales of this winter, it may be noted, have shown how Nature can be more destructive of amenities than the woodman with his axe and saws. The choice of timber to be sold has been made with care to disturb as little as possible the loveliness of a famous part of Sussex. Violent winds last month uprooted and laid prone 500 beeches immediately behind the stands of Goodwood racecourse. The trees are huddled on the ground to-day as though a mighty reaper had mown them down."

We recollect that Charles, 3rd Duke of Richmond (Ambassador at Paris and subsequently Secretary of State in the Cabinet of the younger Pitt), was Vice-President of the Society and appears in Barry's pictures in the Society Rooms. He established a School of Art in Whitehall, with Wilton and Cipriani as masters.

Art.—There are two exhibitions at the Claridge Gallery in Brook Street, of Alfons Purtcher and Countess Nora Wydenbruck; they are not very accomplished painters in any academic or technical sense, but both seem to share the same vigorous joy in depicting life and nature which gives their work a certain charm. Alfons Purtcher paints mostly animals. I was particularly struck also by a picture called "Seagulls," which had a most remarkable atmosphere and impression of waves. His portraits are rigid and conventional compared to his other work.

Countess Nora has less technique and variety, but her style of depicting sunlight and trees is original, especially in a picture called "The Bow Arch" and some Irish landscapes.

At the Howard Gallery there is a collection of pictures belonging to Mr. E. Hockcliffe, by an unidentified French artist—there is a question as to whether or not they are by Corot but quite apart from authenticity it is a very delightful collection and well worth seeing. Certainly the artist, or artists, is far too individual to be a mere copyist, and except as a question of actual value, it seems immaterial who painted them. They are little oil paintings full of colour and exquisite drawing; "Trees and Roman Ruins" and "An Italian Landscape" are particularly interesting and beautiful examples.

This question of authenticity raises the argument again of our national relation to Art. Broadly speaking, our ideas on Art and good taste are superimposed, they come from the outside; that is why we set such store by names and wait to see who has painted a picture or composed a piece of music before we dare say whether it is good or not! Art is also largely a question of monetary value and taste is directed by a few rich people. Therefore, because we divorce art or good taste—call it what you will—from national life, we have no opera, no national theatre, and even our National Gallery is at its liveliest on a wet day! In most other European countries the average person enters into the events of Art and music more or less as he enters into the events of politics—it has a foundation and a part in national life—but the Englishman boasts proudly and loudly with the final and unanswerable criticism, "I don't know anything about art, but I know what I like." To the ordinary man Art is bounded by the frame of a picture, and music by something played on the piano, and it is because of these iron barriers and conventions that our countryside is deteriorating into villages of iron sheds and untidy advertisements. We *must* get away from the Academy meaning of the word Art—substitute "taste," or "beauty," or what you will—but we must get it out of the picture frame and apply it to life—that is the only salvation.

This is a digression from an unknown French artist, and yet really it is not so far away; many people will go to this exhibition and be much more worried about whether the pictures are genuine Corot than whether they are good pictures- but, as Shakespeare says, " What's in a name ? "

Drama.—A good omen for the few who uphold the real drama there is " standing room only " in the Pit at the Court Theatre, where " Hamlet " is being given by the Macdona players, with Mr. Esme Percy in the part. It is an interesting production taken at a great pace and rather emphasizing the drama of the play than the literary side.

Mr. Percy is a fine actor, but he has not all the qualities for Hamlet; he fits the production admirably by bringing out the dramatic and emotional qualities, but there is nothing of the scholar or dreamer about his interpretation. As no Hamlet, however, can play every facet of the character, it is interesting to see it in a new light. He plays the scene with the Queen and the death of Polonius magnificently, getting every ounce of drama and pathos, and working up to a magnificent climax. This Hamlet should be seen. The critics say that Ophelia does not " make enough " of her part, but for the first time it seemed that she was in focus with the rest of the play, she acted it as a young and simple girl with great beauty, and the play balanced infinitely better when Ophelia was not made a " star " part.

" Disraeli," with Mr. George Arliss, is the talkie most worth seeing ; it is well put together and acted, but needs some cutting in places.

Books.—Evelyn Waugh's much discussed book, " Vile Bodies," is a half humorous, wholly satirical criticism of modern society; it is entertaining whether from the lightness of touch or depth of cynicism. Mr. Waugh barely conceals personalities and events, but he never allows the thinnest of ice to crack. He writes with great vigour and distinction of style. Mr. Terence Greenidge writes on " Degenerate Oxford ? " (the question mark is his), and his study of the ultra-modern undergraduate is just as challenging as Mr. Waugh's book in an entirely different way. In both cases the author leaves us wondering whether the moderns are heading for destruction or a glorious Utopian freedom. Mr. Greenidge gives an interesting study of æsthetes and athletic sets and their different points of view. His writing is rather too confident, and he lays down the law when sometimes one feels he should merely state a case and not give his judgment.

Colour Determination.—Mr. Holbrook Jackson gave a very interesting lecture on Wednesday, February 12th, and unravelled most vividly many varied aspects of colour as applied to materials and the Fashion Trades. He dealt with the whole question of colour from quite a new angle, and let us into the secret and origin of those mysterious colours in sale advertisements described as " Saxe," " Helio," " Nigger," and " Bottle," and many other shades more subtle and poetical. He also pursued his investigations into the colour names used in different centuries which provide us with a key to the clothes and ideas of the time. It is sad to hear that we have to obey the dictates of the French in the matter of colour, but as they lead in fashion and the Germans have the supremacy in dyeing, it is as usual a hard struggle for England to try and keep up.

We recall with interest that before Mr. Holbrook Jackson started organising and editorial work in connection with fashions and furnishing, he had a distinguished literary career, being for some time editor of *T.P.'s Weekly*, and later of a delightful monthly review called *To-Day*.

NOTICES

NEXT WEEK

MONDAY, FEBRUARY 24th, at 8 p.m. (Cantor Lecture). ALFRED B. SEARLE, " Recent Improvements in Methods of Brick-making." (Lecture II).

TUESDAY, FEBRUARY 25th, at 4.30 p.m. (Dominions and Colonies Section). ARTHUR W. HILL, C.M.G., Sc.D., F.R.S., Director, Royal Botanic Gardens, Kew, " Scientific and Industrial Research in the British Empire." LIEUT. GEN. SIR WILLIAM FURSE, K.C.B., D.S.O., Director, Imperial Institute, will preside.

WEDNESDAY, FEBRUARY 26th, at 8 p.m. (Ordinary Meeting). WILLIAM G. CONSTABLE, M.A., F.S.A., Assistant Director, National Gallery, " Italian Art and the Italian Exhibition." LADY CHAMBERLAIN, G.B.E., will preside.

COUNCIL

A meeting of the Council was held on February 10th. Present :—Mr. Llewelyn B. Atkinson, M.I.E.E., in the Chair ; Mr. Alfred C. Bossom, F.R.I.B.A. ; Captain Sir Arthur Clarke, K.B.E. ; Mr. Peter MacIntyre Evans, M.A., LL.D. ; Sir Edward Gait, K.C.S.I., C.I.E. ; Mr. P. Morley Horder, F.S.A. ; Major Sir Humphrey Leggett, R.E., D.S.O. ; Sir Philip Magnus, Bt. ; Sir Reginald A. Mant, K.C.I.E., C.S.I. ; Col. Sir Henry McMahon, G.C.M.G., G.C.V.O. ; Sir Henry A. Miers, F.R.S. ; Mr. J. A. Milne, C.B.E. ; Sir George Sutton, Bt. ; Mr. Carmichael Thomas and Lt.-Col. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., with Mr. G. K. Menzies, M.A. (Secretary), and Mr. W. Perry, B.A. (Assistant Secretary).

Dr. E. Frankland Armstrong, F.R.S., was elected a Vice-President of the Society and member of the Council in place of Lord Bledisloe, who resigned office on his appointment as Governor General of New Zealand.

The following candidates were duly elected Fellows of the Society : –

Bective, The Earl of, London.
Bernhard, Gerald Joseph Conrad, Pretoria, South Africa.
Blount, Stanley, L.R.I B.A., Uxbridge, Middlesex.
Bowen, Ernest David William, East London, South Africa.
Butler, Raymond Renard, M.Sc., Plymouth.
Cripps, Hon. Stafford, K.C., Filkins, Glos.
Dawes, W. D., London.
Dolman, Bernard, London.
Dore, C. Noel, Pinner, Middlesex.
Elrod, Henry E., Houston, Texas, U.S.A.
Evans, William Edward, Kalaw, Southern Shan States.
Greenfield, Ben Spencer, New York City, U.S.A.
Grocott, Albert Edward, Bangkok, Siam.
Gullraj, Salig Ram, Calcutta, India.
Hagger, Willoughby Rupert Osborne, New Barnet, Herts.
Heaton, Beresford, B.A., J.P., London.
Hennessey, Captain Dudley Michael Leslie, J.P., Rangoon, Burma
Hill, John Burrow, London.
Hunter, Charles Herbert, M.A., Sidmouth, Devon.
Inouye, James Masanaga, B.S., M.A., Ph.D., New York City, U.S.A
Low, W. Ralph, F.R.I.B.A., London.
Piersall, C. E., M.D., Reno, Nevada, U.S.A.
Prentice, Andrew N., F.R.I.B.A., London.
Read, Alfred Burgess, A.R.C.A., Banstead, Surrey.
Rees, John Morgan Griffith, London.
Somerville, Charles, Ashford, Middlesex.
Starmer, Walter Percival, Edgware, Middlesex.
Symington, Mrs. Colquhoun, Seale, Farnham, Surrey.
Tomlinson, John Lansdowne, M.A., Isleworth, Middlesex.
Trent, Lord, Cannes, France.
Walter, Ralph, M.A., London.
Whitgift, Mark, B.Sc., M.I.E.E., London.
Whitworth, Geoffrey, London.
Wilkins, A. J., London.

Further consideration was given to the question of the award of the Albert Medal for 1930.

Certain points in connection with the proposed plans for Charing Cross Bridge were considered, and a sub-committee was appointed to examine the suggestions and report to the Council.

It was reported that the butcher's shop in West Wycombe, with adjoining ground of about an acre, had been purchased for £2,000, and that the purchaser, who decided to remain anonymous, had offered the property to the Society for £1,000. In view of the fact that the shop occupies a prominent position in the centre of the village, it was resolved to accept the offer and to convey the thanks of the Council to the anonymous donor.

A quantity of formal and financial business was transacted.

TWELFTH ORDINARY MEETING

Wednesday, February 12th, 1930. Mr. Forrest Hewit, Director, Calico Printers' Association, Ltd., in the Chair. A paper entitled " Colour Determination in the Fashion Trades " was read by Mr. Holbrook Jackson, Editorial Director of *The Drapers' Organiser*. The paper and discussion will be published in the *Journal* at an early date.

CANTOR LECTURES

Monday, February 17th, 1930. Professor Henry E. Armstrong, Ph.D., LL.D., D.Sc., F.R.S., in the Chair. Mr. Alfred B. Searle delivered the first of his course of three lectures on " Recent Improvements in Methods of Brickmaking." The lectures will be published in the *Journal* during the summer recess.

PROCEEDINGS OF THE SOCIETY

DOMINIONS AND COLONIES SECTION.

Tuesday, January 28th, 1930

The Right Hon. W. G. A. Ormsby-Gore, P.C., M.P., in the Chair.

The Chairman said that most of those present who were connected with East Africa would know that Kenya had been singularly fortunate in catching Sir Daniel on his way back from the meeting of the British Association for the Advancement of Science last summer, and securing his services as Chairman of a local committee of inquiry into the work and organisation of the Agricultural Department in Kenya. Sir Daniel needed no introduction to anyone interested in agricultural science. He was best known as one of the long line of distinguished successors of Lawes and Gilbert as head of the premier agricultural research station in the Empire, Rothamsted. After that, Sir Daniel became Scientific Adviser to the Ministry of Agriculture. He was a Fellow of the Royal Society, and of recent years had been carrying on Bateson's celebrated work at the John Innes Horticultural Institution.

No one could be more equipped in knowledge and experience, both administrative and technical, than Sir Daniel Hall to give any audience an account of the agricultural problems of any country. Kenya, and indeed East Africa as a whole, was fortunate in having secured his services even for a few weeks.

The following paper was then read:—

SETTLERS' PROBLEMS IN KENYA

By Sir Daniel Hall, K.C.B., D.Sc., LL.D., F.R.S.

Director, John Innes Horticultural Institution, Chief Scientific Adviser, Ministry of Agriculture

From the outset it should be borne in mind that white farming in Kenya is a very recent affair. It was only after the South African war and the opening of the railway in 1903 that any settlers penetrated into the country with the intention of living there by agriculture. Even these men began with pastoralism, attracted by the great areas of grass upon the plateaux, grass which in many districts remains green the year round under the equable climate and the double rains. But they had not reckoned with the prevalence of disease, particularly rinderpest and East Coast fever, and they were perforce driven to agriculture, to maize and wheat growing, before the value of coffee and sisal had been established. Even sheep, which at first had done well in the Rift Valley, became infected with heart water after the Masai trek through that region, and for a time were abandoned.

Hence there has been very little time in which to establish a tradition of farming, that kind of summation of many years' experience and observation upon which the practice of agriculture in the old countries is based. The conditions too are unprecedented :—Altitudes of 6—10,000 feet under a tropical sun and with an equatorial climate of no pronounced seasons but two rainy periods. I myself have passed in a few steps from a wheat field ripe for harvest to a garden in which the peach trees were blooming. One of the older settlers and wisest farmers in the Colony told me that when he began he sowed wheat every month in the year before he made up his mind what was the proper procedure. As a consequence of these novel conditions it is impossible to transfer with any certainty the knowledge that has been acquired in other countries to Kenya ; the problems of the farmers there have to be solved by continued observation and by research. But research, even if you can ensure capable men, takes time, and a settler who sees his crop endangered or his stock dying daily is apt to get impatient with a Department of Agriculture which can propound no immediate remedy. Let me give an example. A settler found his crop of wheat attacked by a mob of small birds at a time before the grain had formed, when the ear was just developing. The birds were not the ordinary grain eaters which attack cereals, but insectivorous birds which were attracted by the soft milky tissue of the nascent ear. The proved methods of dealing with grain eating birds were of no value ; a search through the literature revealed no similar case ; beyond the ordinary devices for scaring no advice to the settler was available. Investigation into the life history of the birds may reveal a way of reducing their numbers or warding off the attack, but meantime the settler must put up with the risk of losing his crop.

STOCK FARMING.

I have already alluded to the difficulties of stock raising owing to the prevalence of disease. Africa has always possessed an unenviable notoriety owing to the variety and virulence of the animal diseases that are there endemic. There are indeed few of the known epizootics which do not take their toll of life stock in Kenya ; doubtless there is no lack of unknown ones still to be identified. " Ngami," which is carried by the Tsetse fly, exists in some of the tropical parts of Kenya near the coast and the Lake but does not trouble the settler in the uplands. He has to deal chiefly with rinderpest, East Coast fever, redwater and anthrax, and foot and mouth disease, although the latter is a mild affair, of which little account is taken. The others are steadily yielding to investigation ; their eradication is only a matter of time and care. But even when a sound form of treatment is available its application does represent some expenditure, and the Kenya stock farmers at present remain under a handicap compared with their competitors in other countries like non-tropical South America and Australia, where cattle breed and thrive with little or no attention. It has been estimated that the preventive measures which have had to be taken in Kenya add £2 a head to the cost of a four year old beast. Rinderpest is at present dealt with by a process of double inoculation which confers practical immunity on the treated animals for their normal working life. It is carried out on a very large scale by the veterinary service, 156,000 cases in 1928, but it is not without some element of risk, the mortality being about 2 per cent., and there have been some bad accidents in the past, owing to the introduction of piroplasmosis with the virulent blood. This is now being guarded against by the use of blood only from animals which have been maintained tick free from birth, but this adds to the cost of the operation, because the veterinarian must take with him one of these prepared animals, unless it is proved that the pure blood can retain its effectiveness when transmitted on ice from the central laboratory. Investigations in progress at Kabete give very definite promise of the possibility of the replacement of this double inoculation by a single vaccination, but the procedure is still being tested out.

East Coast fever, which for a generation has been such a menace to stockkeeping in the whole of East Africa right down to the Cape, has to be dealt with in another fashion. It is a tick-borne disease, and as has been found in the Union, it can be controlled by dipping to destroy the ticks. The first necessity, however, is the enclosure of the grazing into paddocks within which the cattle are confined without allowing any contacts with outside cattle. The stocks are then dipped as frequently as every third day in an arsenical dip ; this kills the ticks before they can inoculate the cattle. Eventually the tick population of the farm becomes greatly reduced in number and the survivors are free from disease, since each generation of ticks has to be re-infected by feeding upon a diseased animal. By this rigorous process many areas in South Africa have been freed from East Coast fever. Few of the settlements in Kenya are yet fenced and paddocked, and one of the necessary starting points before the white grazing areas can be cleaned up is the erection of boundary fences where they border upon the native reserves. Another urgent measure is the elimination of squatter cattle in any stock-keeping area. It has been customary in Kenya for settlers to allow the natives who are working on their plantations not only to have land for cultivation, but also to keep stock and to graze them upon the land that is not under cultivation. This liberty is often abused ; the native keeps not only his own stock but takes in his charge other stock belonging to his family or tribe, so that many settlers impose a limit upon the numbers each native may graze. But in any case the natives are continually changing stock between their location and their reserve, and though movements of stock are restricted, they are none the less illicitly effected at night and by routes that take the stock over other settlements. Thus disease is spread even on land that is fenced. It is perhaps impossible to prohibit the keeping of squatter cattle universally. On coffee plantations and similar estates, where no stock are kept, settlers find it easier to keep their labourers if they allow them cattle. In some other districts, however, settlers have already come to an agreement not to allow squatter cattle. Possibly legislation is needed to enable areas to be scheduled within which squatter cattle are forbidden when a majority of the settlers agree, and such legislation may well follow the measures now under consideration for the formation of areas within which fencing and regular dipping will be compulsory. These steps are imperative if the country generally is to be cleaned up. It should be borne in mind that this procedure is required by the agriculturist as well as by the stock farmer. The maize grower requires work oxen, and though he can buy salted animals among which the mortality is small, it is desirable that the maize grower should become a mixed farmer, keeping some kind of stock in order to make farmyard manure and so restore to the soil the humus of which it is so much in need. Fencing and dipping will also reduce the danger of red water and other tick-borne diseases, but there is also an immunisation inoculation which is effective against red water.

The tick danger will also be diminished, and, indeed, the whole situation, both as regards nutrition and disease improved, when agriculture can be advanced to the stage of laying down artificial pastures upon ploughed land. Enough work has been done to show that some of the East African grasses possess a much greater feeding value than the ordinary mixed herbage. This is a question of much interest requiring investigation, especially as some of the varieties of great value rarely, if ever, set seed and have to be propagated by stolons. But it requires following up, since it is universal experience that made pastures are healthier than old grass land ; the plough is a great purifier of the land.

Recent enquiries have also shown that some areas of Kenya are subject to deficiency diseases. The soil, and in its turn the pasture, supplies an inadequate amount of some of the mineral constituents of the animal's food, *e.g.*, calcium, iron, phosphoric acid or iodine. These deficiencies are being investigated under the supervision of a Committee of the Civil Research Committee and the scientific direction of Dr. John Orr, of the Rowett Research Station in Aberdeen. When determined they can be met by the provision of licks and sometimes, as the farming becomes intensified, by the due use of fertilisers.

Perhaps the most serious question regarding the future of stock-keeping in Central Africa is that of the breed to adopt. Most of the new countries of the world have been stocked with the British breeds that were so early selected and fixed by the labours of the great fanciers of the late eighteenth and early nineteenth centuries, and the enormous multiplication of the Shorthorns, Herefords, Devons, etc., throughout America and Australia speaks of the adaptability of these races and the sound foundations upon which they were raised. The only breed other than the British which has attained a world-wide distribution is the Dutch or Friesian black and white dairy cattle. The usual procedure in new countries possessed of some general utility stock of no particular quality has been to introduce pure bred sires of one or other of the above breeds and by repeated crossings to grade up the herds to approximate purity. How successful such a policy can be is to be seen in the fine stock now possessed by the Argentine. But it is agreed that where a country owns a distinctive race of its own more permanent results are likely to be attained by selection within that race, by subjecting it to the processes by which the Shorthorns and Herefords were created in England. This argument is particularly applicable when the climate differs widely from the temperate conditions of England. The native cattle of East Africa, generally dun-coloured and long-horned, are of very mixed origin, in which Oriental blood has been infused from early times, as may be guessed from the prevalence of the hump. But they have acquired a certain measure of resistance to the African diseases and for that reason alone they offer better prospects by selection than by crossing, of building up a race suited to the country.. The introduction of British stock is attended by very great risks and even the cross breds are more susceptible to disease than the native stock.

It must not be supposed, however, that even at the present time stock farming is negligible in Kenya. Europeans own about 110,000 breeding cattle, of which more than two-thirds are grade stock with some proportion of European blood, but these numbers have remained almost stationary for the last five years. Dairying, too, is making steady progress in the highlands near the railway, and a prosperous co-operative creamery is at work at Lambwa. It is worth considering whether many settlers could not avoid some of the risks of disease by keeping a small herd entirely indoors on the soiling system. Contact with ticks would be minimised and those that would be introduced in the green fodder would be removed by a daily grooming. Of course, labour is involved in such a system, but the price of dairy produce is high enough to pay for it.

There are considerable potentialities of extending sheep breeding, since it is now possible to control heart water by an immunisation which can be carried out by the farmers themselves with material supplied from the Veterinary Laboratory. The drier plains and the Rift Valley will carry merinos while the plateaus and higher country are more suited to dual purpose sheep like the Romney Marsh. There are undoubted difficulties to be overcome. It takes some time to get the grassland fine enough for sheep, and in many districts they have to be rounded up and watched at night because of the leopards and other vermin. Sheep stealing too by the natives is not unknown. The number of sheep owned by settlers is showing a satisfactory increase from 134,000 in 1924 to 176,000 in 1928.

Putting aside coffee for the moment, the most important crop in Kenya is maize, of which about 200,000 acres are grown by white settlers, with a production for export of about a million bags of 200 lb. Almost exclusively white dent varieties are grown of high quality. The average yield per acre, about 1,600 lb., is not high nor does it appear to be increasing, and this in the main is due to factors which lie at the base of the farming in Kenya. Some better return may be expected from improved varieties, the breeding of which is just being taken in hand. Greater resistance to certain diseases peculiar to the colony may thus be attained, but there is little reason to expect that new varieties will be created with a yielding capacity markedly in excess of the standard American varieties now being grown. Progress has to be sought in soil management and cultivation. Maize is generally grown year after year on the same land, and there is evidence that on many soils the yield falls off rapidly from year to year so that new ground has to be broken up. This decline in all probability is to be correlated with the diminution in the humus content of the soil. The normal red soils of Kenya, other than the black land in the swamps and hollows, are not initially rich in organic matter, and that which is at the outset contributed by the natural vegetation turned in by the first ploughing very rapidly decays owing to the dryness and high temperature which the soil attains at certain seasons of the year. Hence the humus runs down rapidly, and this is attended by a deterioration in the texture of the soil and in its capacity for retaining the seasonal rains. Soil erosion and washing is also markedly increased after the land has thus been cropped for some time. It is, moreover, a very general custom to burn the stalks and trash because of the mechanical difficulty of turning in the material and getting the land ready for the succeeding crop. As so little stock are kept on the maize-growing farms very little farmyard manure is made and returned to the soil. It is important to stop burning the stalks, which could be converted into manure by the Adco or similar process. The general run of Kenya soils will not long tolerate this kind of mining into their fertility, and a stable system of farming depends upon the introduction of a rotation, more conservative of fertility and capable of restoring humus to the soil. One obvious step in this direction is the introduction of a green manuring crop. There are many leguminous plants capable of giving a great bulk of herbage in Kenya, soya and velvet bean, cow peas, crotalaria, etc., but sufficient experience has not accumulated to decide which is the most effective. It has also yet to be ascertained under the various conditions how the green manuring is best managed; for example, in Rhodesia experiments indicate that it is desirable to take a period of bare fallow after ploughing in the green crop, but this may depend upon the incidence of the rains. One other factor is indicated by some experiments. Soils that have begun to run out do not carry a large enough crop to be worth much as green manure, unless some phosphatic fertiliser is applied before the legume is sown. Hence green manuring must also involve the use of artificial fertilisers. It is evident that many of the Kenya soils respond markedly to fertilisers, which are, however, very dear because of the distance from the source and the burden of freight. The Colony itself produces no fertilisers, though a phosphatic guano is obtainable from the Seychelles. There is evidently an opening for some of the newer fertilisers now being manufactured with a very high concentration in the essential elements of fertility. Synthetic urea for example contains over 45 per cent. nitrogen, synthetic ammonium nitrate about 35 per cent., whereas sulphate of ammonia contains only about 21 per cent. and nitrate of soda less than 16 per cent.

But even if the green manuring is adopted it is desirable to introduce other crops into the rotation, and the desideratum in Kenya is a pea or bean crop that will yield a marketable product. Some trials have been made of English peas and of ground nuts, and experiments are being made with the American varieties of soya bean. The latter if successful would be of great value, because the soya bean might become important in the native dietary as well as for export.

After maize, wheat is the most important crop of the uplands. About 80,000 acres are under wheat and in some districts it is the only crop grown. The average yield is, however, still low, in the order of 8-10 bushels per acre, lower than the corresponding yields in Australia and Argentina. The improvement of the soil fertility is as important for wheat as for maize. Considerable work has already been done in breeding varieties of wheat suitable to Kenya, where the problem is to obtain varieties that shall be resistant to two stem rusts. One variety, "Kenya Governor," has already been raised which is proof against the black stem rust prevalent at the lower altitudes, but up at 8–10,000 feet this variety is affected by the other type of rust. The plant breeder is now distributing some new varieties which on the small scale have stood the test of both rusts. Time is required to determine which of them is going to prove a good commercial proposition and yield satisfactorily, but a solution of the chief difficulty is now assured. The growth of wheat is now sufficient for the needs of the Colony, and an export trade has begun to the neighbouring colonies and to South Africa.

Barley is also a promising crop, the grain being of good quality, and the acreage though small (about 6,000 acres) is increasing.

Maize, wheat and barley complete the tale of the crops that are being grown on the ordinary farm up on the high lands, many other crops are being experimented with, though they have attained no commercial importance. Flax has disappeared, though it may be revived if the recent recovery in the price of fibre becomes stable. Tobacco can be grown, but the market is so much determined by taste and custom and dominated by powerful corporations as to render ventures in tobacco growing very risky.

Of what may be termed the plantation industries, coffee is easily the most important. The area under coffee had reached over 84,000 acres in 1928, having increased by 9,511 acres within the year. The value of the exports was over £1,400,000 in 1927-28. Coffee is an intensive highly farmed crop comparable with fruit in this country. It requires considerable capital and many of the plantations are large and in the hands of companies rather than individuals. As an intensive crop planted in considerable blocks it is subject to mass attacks of disease, the prevention of which calls for systematic investigation. The Department of Agriculture in Kenya has devoted considerable attention to coffee problems, especially on the entomological side, where three men are almost wholly employed on coffee. A considerable expenditure has recently been incurred in an organisation for the mass production of certain lady-birds which keep in check the "mealy bug" (*Pseudococcus lilacinus*), that is the worst insect pest of coffee. Potatoes are sprouted in houses as a host for the aphis on which the lady-birds can be reared. In this way the Department will be able to supply a large colony of lady-birds to deal with an attack of mealy bug in a plantation before it has developed far, when the natural population of lady-birds, which has already been introduced, has grown strong enough to meet the attack. In nature the lady-bird population lags behind the mealy bug attack, since it only begins to grow when the food supply has become abundant, and considerable damage may be done before the parasite can exercise its control.

The control of "mealy bug" by lady-birds is complicated by another factor, a small red ant (*Pheidole punctulata*) which swarms over the coffee bushes and attacks and drives away the lady-birds. The ant protects the mealy bugs because it feeds upon the honey-dew which they secrete. This ant has become abundant in the coffee plantations, because a predatory ant which used to keep it in check has been driven away by the constant cultivation to which the plantations are subject, since this latter ant makes its nest just below the surface of the soil. The problem then arises of finding a method to keep the bushes free of ants, and it has been found that a paper band round the base of the bush smeared with a belt of a particular creosote preparation would interpose an effective barrier, if no tall weed or branch was allowed to form a bridge between the soil and the foliage of the bush. This protection answered, until subsequent supplies of the creosote material from Europe were found to be no deterrent to the ants' passage. Further research was then needed in order to ascertain the particular constituent in the earlier creosote that was active. Not only the particular fraction of the creosote, but the temperature at which the coal is distilled and perhaps even the source of the coal, are involved. This story illustrated the elaborate chain of investigation which is sometimes necessary to deal with an agricultural problem that on the surface appears simple enough.

However, it is necessary to push the defence measures further back and study the conditions of growth of the coffee plant, which becomes attacked by this and other pests in so far as its proper vigour and constitution are impaired. The question of the provision of shade in the coffee plantations is still a matter of dispute. Coffee is generally regarded as requiring some shade, and it is common to interplant the coffee bushes at somewhat wide intervals with a light shade tree like *Grevillea robusta*. In other cases the shading is confined to belts of the *Grevillea* and other trees, while there are many plantations growing freely without shade at all. Experiments are being made with artificial shade provided by slats of wood supported on wires above the bushes. In this way the amount of shade given can be adjusted and there is no draught on the soil moisture. Some observers hold that the crucial thing is to shade the ground by means of a surface cover crop. It is pretty certain that the amount and nature of the shade required depends upon factors like depth of soil, aspect, elevation and rainfall, and that further investigation will show that no one method will apply to all cases

Some evidence has been obtained that the growth and healthiness of the coffee after it has come into bearing is dependent upon the reaction of the soil, and that the incidence of disease can be correlated with the presence of an acid layer in the subsoil This requires further investigation, the outcome of which may be that the soil chemist will be in a position to warn settlers against planting coffee in particular soils Undoubtedly there are cases of plantations wrongly placed , further, the whole question of the use of fertilisers requires systematic study The crop is valuable enough to pay for fertilisers, and there is evidence that both the yield and the health of the plantations can be greatly improved by the judicious use of fertilisers Time will not permit me to discuss the interesting methods that have been evolved for dealing with some of the pests of coffee, but I should like to emphasise the need of some special organisation for continuous investigation on a crop like coffee However seriously a Department of Agriculture may approach the question there is always the danger that its technical officers, after they have acquired a body of experience in regard to coffee, may be transferred to another colony, either in order to obtain promotion or because they are disinclined to specialise too much on one subject For this and other reasons the recent Commission in Kenya has recommended the formation of a special research institute for coffee, the funds for which will be provided in part by licence fees of £10 per hundred acres from coffee growers and in part from the Government This would provide both greater continuity in the coffee work and special remuneration where need be The exact relations between the Department and this Institute require further consideration One type of research in connection with coffee has not been attempted, yet is of fundamental importance, and that is breeding Coffee bushes are raised always from seed, and though distinct types of coffee have been segregated, *e g* , *arabica*, *robusta*, *liberica*, one has only to walk through a plantation to see the great range of variation in the plants in such matters as habit of growth, productivity and disease resistance Here is clearly work for the plant breeder, who would begin by selection and trying out the best system of vegetative propagation, in order to obtain a plantation that is uniform for high yield and disease resistance It is becoming evident that the best way of combating plant diseases is by breeding immune varieties, though this is more easily attained in regard to fungoid than insect invasions

Sisal is also a growing industry, which can be pursued both on the coastal area and at elevations up to 7,000 feet In 1927-28 the area under sisal increased by over 20,000 to upwards of 84 000 acres, of which nearly 50,000 were ready for cutting, with an estimated output of 365,000 cwt. of fibre A research association, to which the sisal growers will make a contribution according to their acreage, is also under consideration

Tea is also rapidly being developed in the Colony on the uplands where the rainfall is considerable, especially in the Kericio district. Tea is still very new, for though about 7,000 acres have been planted, little of it is yet in the productive stage, the production in 1927-8 amounting only to 33,000 pounds But the prospects are regarded as very promising both as regards yield and quality, and two of the great British tea companies have embarked considerable capital in the plantations and factories. One of these companies is undertaking the drying and preparation of the tea grown by a group of settlers within reach of the factory.

One other development is of interest, though as yet only in a tentative stage; there are 473 acres planted with geranium and other plants yielding essential oils for distillation. The recent Commission recommended the appointment of an economic botanist to investigate the possibilities of the introduction of other tropical and sub-tropical crops, both for the coast and the upland areas. The value of the return that may be obtained from such work is difficult to overestimate; it is reported that the whole of the great Sisal industry grew up from a few plants first intriduced into a garden. Doubtless, the research station at Amani in Tanganyika, which was established by the Germans and has recently been re-organised and equipped by the Colonial Office in conjunction with the governments of all the East African territories, will play an important part in this connexion.

Lastly, perhaps the major problem before the settlers of Kenya is that of the employment of native labour. There was a time shortly after the war when it appeared that the supply of volunteer labour was inadequate for the expanding cultivation, but at present the settlers who treat their natives properly have no difficulty in obtaining an adequate labour force. In fact it is generally held that any man who complains that he cannot obtain labour has condemned his own management. It does not, however, follow that the sources are inexhaustible and that the expansion of cultivation which may be expected in the areas reserved for white settlement can easily be staffed on the present system, especially as the natives are improving their own agriculture and are growing crops for sale to an increasing degree. The instruction they automatically receive in improved methods of cultivation on the European plantations, as well as on the plots they cultivate there for their own sustenance, all tends to draw men back to their own reserves, since they can now turn them to more efficient use. Hence it is important that settlers should give close consideration to making their native labourers as efficient as possible by instruction in the actual operations, by organisation, and by the use of machinery and every means of economising on sheer manual effort. There is no greater temptation to slipshod methods and wasteful processes than a lavish supply of cheap labour. There is ample evidence that the natives of most of the Kenya tribes are educable, though of course it would be easy enough to collect a volume of instances of their incapacity. Here as always the good employer gets the good workman.

There is another side to this labour question that demands consideration, whether it is not desirable to bring in British workmen to act as foremen and leaders to the native gangs. Some settlers have done so with success, especially where machinery is being utilised.

To make a success of this method it will be desirable to afford opportunities for such men to acquire holdings of their own, beginning on a small scale that enables a large proportion of the work to be done by the man himself. A closer settlement scheme of small farms is already under consideration, but this scheme chiefly contemplates settlers coming straight from Britain into occupation of the farms. These men would be more likely to succeed if they had worked in the Colony for some years before starting on their own account. These schemes are opposed by many settlers on the ground that they might lead to the growth of a class of "poor whites," without capital to farm on their own account and unable to obtain employment such as is appropriate to the dominant white race. I hold that this view is mistaken. The "poor white" class has arisen in South Africa precisely because public opinion has ruled out manual labour upon the land as a fitting occupation for a white man. If an aristocratic class is created that cannot be allowed to dig, some members of it inevitably will become not ashamed to beg. Agriculture is and must remain the prime source of employment in Kenya, and if a permanent white population is to be maintained there must be opportunities in the only industry of the country for all sorts and conditions of men. Some will rise and some will fall, for thus is progress and leadership assured.

I have made no attempt to deal with the many other problems that Kenya presents, such as erosion of the land, the very big affair of native agriculture, or social and political questions, but have confined myself to agriculture as practised by the white settler. Limited as my experience has been I can only say that I have seen few countries more taking to the farmer's eye, or where a man may look forward with more confidence to settling down and founding a family.

DISCUSSION

THE CHAIRMAN said that after such an interesting paper, and in view of the fact that so many people familiar with East Africa were present, he was quite sure there would be an interesting discussion. It was customary for the chairman to say one or two words at the outset, and in case there were some people in the audience who were quite unfamiliar with the particular basic facts of Kenya, he would content himself with stating briefly what those facts were, as a sort of background to Sir Daniel Hall's paper and the discussion generally.

Kenya was a country which as far as they knew was entirely without mineral resources, if the Magadi soda lake was excepted, and so it depended entirely for its future progress and prosperity upon both Europeans and natives in that country being able to make farming pay—which was a very difficult problem in every country in the world at the present moment. The next fact about Kenya was that it was rather more than four times the size of England, but it was a very sparsely populated country, even for Africa, containing only 2,500,000 inhabitants. Its native population was less than half that of its neighbour, Tanganyika Territory, and was one million less than that of its much smaller neighbour Uganda. Kenya was quite a unique country. There was no other country in the world at all like it, climatically, with the possible exception of Ecuador on the Equator in South America. A considerable portion of its area consisted of a plateau 6,000 to 7,000 feet above sea level. Consequently, the country had to have both Europeans and natives capable of living comfortably at such an altitude.

Kenya, as Sir Daniel Hall had told them, was dependent very largely for its prosperity on the introduction from outside of crops not indigenous to the country. Even coffee, which grew wild in the near-by territories of Abyssinia and the Southern Sudan, the original home of all the coffees in the world, required very special safeguarding in Kenya, for the pests were such that unless coffee was carefully safeguarded and protected it could not possibly survive a single season. Another fact to be borne in mind was that, as Sir Daniel Hall had told them, although Kenya had a temperate climate it was in fact on the Equator and had all the equatorial pests, including malaria, which was one of the problems before the settler farmer. It was now pretty well established that approximately half the total native population of Kenya was an endemic reservoir of malaria. As in so many native countries malaria in a mild form had affected the people from childhood upwards in such a way as to give a malaria carrying population, and Europeans introduced into their midst– if the third element was present, the particular varieties of mosquito that were capable of transmitting the disease—would get malaria and, if they had it several times, perhaps blackwater as well. The protection of the European against mosquito-borne disease was as important in parts of Kenya as was the protection of his cattle from the ticks by dipping, and their protection by inoculations or vaccines against rinderpest, which was carried not merely by native cattle, but by the wild game of the country. And so though Kenya had the outward appearance of a temperate climate, every settler who came to that country must realise that he had to face absolutely strange conditions.

There were two points in the paper in regard to which he would like to say something. The first was on the subject of green manuring. In his visits to different parts of the tropics he had always taken great personal interest in green manuring, which he was quite sure was one of the most vital things in tropical agriculture. In the absence of winter and of conditions like those experienced in this country or in South Africa, one was faced with a much more rapid destruction and loss of nitrogen from the soil, and the only hope of successful and continuous cropping in a tropical country was to give attention to the leguminous manuring problem. In Java they had carried out green manuring to such an extent that even in the smallest native village green crops were planted in between the other crops in their gardens, and one of the chief reasons for the prosperous native agriculture of Java, as well as for the prosperous European plantations, was the scientific treatment of green crops which had been practised in that country for so many years.

Another point to which he would like to refer was that of the " poor whites." He was quite sure there would be no poor whites among the type of settler that was now going out to Kenya. They were of a very fine type, as could be seen from the way they had come through the currency crisis in Kenya and the whole series of crises since the War. The whole problem of poor whites depended upon the type of education they were going to give to the small European children who grew up amid the black population. Everything depended on the Kenya schools. In every school in this country, except a few bad ones, the European child was put in his place, and he was not regarded as much of a fellow unless he was prepared to stand on his own feet. There was this difficult problem always facing them—the European race brought up among and surrounded by a lot of native servants and with the atmosphere of a ruling race with millions of a lower race in the environment, and the child had never seen true European conditions as they were found in the public schools of England.

As he saw it, the real peril of Kenya was in the future, and it was being tackled properly from the point of view of the possible problem of poor whites by paying attention to the kind of spirit, method and discipline that was adopted in training the European children. He would like to emphasise that apart from the tragedy of the poor white and the nuisance he was to himself and everybody else, the existence of poor whites in a large native community was one of the things which did more harm to a native community than anything else in the world. Who was it who tried to run Cape brandy to the native compounds in South Africa ? Who was it who was at the bottom of every attempt to exploit and degrade the native ? It was the poor white. It was not the good white, and the contact of the poor white with natives was one of the most disastrous contacts for both. Everything, therefore, depended upon the education of the now considerable number of white children, Dutch as well as British, who were born and brought up to regard Kenya as their only home.

MR. C. W. HOBLEY, C.M.G., said they were all very indebted to Sir Daniel Hall for his extremely lucid description of conditions and agricultural and stock farming in Kenya. He only wished there were far more Kenya settlers present to hear Sir Daniel Hall's paper. There were several points which interested him very much, and to which he had given considerable thought. One was the question of lack of nourishment in the natural food plants in certain parts of the country. This fact he was inclined to consider opened up an avenue which warranted further research. There was evidence in most parts of the country of native mal-nutrition and he had noticed, too, that when prospectors and others went off on expeditions and had to depend mainly on native food, they often returned in an anæmic condition. It might be, therefore, that the deficiency disease called " Nakuruitis " had a wider application than was at first suspected, and that the paucity of certain mineral salts might be affecting human lives.

Another of the great--indeed tragic—problems of the country was that of soil erosion ; it was particularly marked in the Kamba reserve and mainly due to goats ; it was not too much to say that the goat was steadily ruining the value of the native areas of Kenya Colony. Politically this was a danger, for a tribe having destroyed the productivity of the area set aside as its reserve would still have to exist. Were they to continue to claim new areas only to continue to ruin these within a short period ? This matter should receive serious attention from the local government.

As the lecturer had explained, if the European planter was to prosper he must get down to the business and utilise scientific methods ; he had now arrived at the stage when the judicious application of fertilisers was essential. Expenses all round had increased and the day was past when the coffee planter could, by haphazard methods, reckon on a 25 per cent. profit. In his opinion, the moment had arrived when groups of individual settlers would have to combine their efforts and employ highly-trained agriculturists : the planting industry would then settle down into a dependable business yielding only a moderate rate of interest on the capital invested. East Africa must no longer be looked upon as a " get rich quick " country.

PROFESSOR HENRY E. ARMSTRONG, PH.D., LL.D., D.Sc., F.R.S., said that in Sir Daniel Hall they had a man whom he believed, among agriculturists, had the longest and most level head. There were, he thought, many points raised by the paper which needed very full discussion. He would like to ask Sir Daniel Hall whether it were necessary that men who went out to Kenya should be technically qualified as agriculturists ? They knew that the men who had made their way in Canada and in Australia had not been men carrying the prejudice of British agriculture with them.

They had been, on the whole, men who had known nothing about agriculture. He gathered from what Sir Daniel Hall had said that such was not the case with regard to Kenya and the only question was : to what extent should the settler be prejudiced by home practice ? He took it that what was wanted was a particularly alert type of mind, cultivated along the lines of experimental inquiry, knowing particularly what an experiment was. That was something which the average agriculturist did not know and the agriculturist of the present type could scarcely learn it. Therefore, the matter was one of very great importance, because English schools to-day were striving to prepare boys for work of that nature. He had been connected with Christ's Hospital School for thirty years, where they were making a very definite effort to establish an agricultural side but they got no response, practically speaking. To-day they could not send out boys to New Zealand. New Zealand would not have them though they had sent them in the past with very good results. He thought that this matter should be discussed very carefully and fully from the point of view of the interests of the schools of this country. He believed it was in the power of the schools to determine the type of boy particularly fitted for the kind of work mentioned and they needed the encouragement which such an occasion as the lecture that night afforded in order that they might do that work.

Mr. S. Simpson, C.M.G., late Director of Agriculture, Uganda, said he had not come to the meeting prepared to say anything, but he had listened with very great interest to Sir Daniel Hall's address. It must have been a great advantage to the Department of Agriculture in Kenya to have had Sir Daniel Hall with them, going into all the various difficulties and problems, which he was afraid they fully realised were both numerous and not very simple. There was no particular contact between the difficulties that had to be met in Kenya and those they had to face in Uganda. The two were totally different propositions ; but he had nevertheless thoroughly enjoyed Sir Daniel Hall's very instructive address.

Mr. R. à-Ababrelton said he would like to say something in reference to the " poor whites." He understood from the lecture that practically nothing of that sort existed in Kenya at present. It existed, however, to a very large extent in other parts of Africa, especially South Africa, which he happened to know well. The point that he wished to bring forward was that they were largely responsible for the terrible unrest which was taking place in South Africa and in other parts not under British control. These men, as a rule, were the offspring in some form or another of the old Dutch settlers. They were called Dutch, but they were not by any means entirely of Dutch blood. There was also a large admixture of Malay and Black blood. He had seen some of the family Bibles that were found during the South African War, and in these Bibles, which were the real family registers, it was not at all impossible to find the names of husband and wife, followed by 25 and sometimes 30 children. It was well known that all those children, although nominally belonging to the husband and wife, were also the offspring of others. There they saw—very plainly—how the " poor whites " came into being. They were the very people who were easily got at by the Bolsheviks, and who tried to upset whatever the Government might be doing in any particular area. They were the real source of much of the trouble which was taking place in South Africa and elsewhere.

Sir Alfred T. Davies, K.B.E., C.B., inquired whether, in view of the slow rate at which native education in regard to the more intensive cultivation of the land must proceed, it was not necessary to make, now, a more considerable provision for the native population's ultimate needs over and above that furnished by the present native reserves? Otherwise they might get, later on, a condition approximating to that of the Mississippi overflowing its banks and of the white people being in the same condition as the American farmer when the Mississippi had overflown its banks.

MAJOR SIR E. HUMPHREY LEGGETT, R.E., D.S.O., proposed a hearty vote of thanks to the Chairman for presiding and to Sir Daniel Hall for an address, which he, Sir Humphrey, regarded as exceedingly important. The paper was the outcome of what he thought was a real stroke of genius on the part of somebody in East Africa in taking advantage of the presence of Sir Daniel Hall and asking him to investigate the conditions of the agricultural and pastoral industries in Kenya and to be Chairman of the local Commission which was set up for that purpose.

It was very appropriate and fortunate that they had been able to get Mr. Ormsby-Gore to take the chair. Everyone in East Africa knew that Mr. Ormsby-Gore had identified himself with all that made for the prosperity and welfare of that important and growing colony. They regarded him as a very true friend, and consequently they followed all that he said with very close attention. The contribution which the Chairman had made that afternoon, even if it had been the only thing to which they had listened, on the subject of the "poor white," what was his danger, and what the human basis of settlement should be in developing such great Imperial assets as Kenya, it would have been well worth while holding that meeting. He, therefore, most cordially echoed what Professor Armstrong had said and hoped that Sir Daniel Hall's observations on the subject of labour and settlement, supplemented by what had been stated from the Chair, might be a prominent feature in the reports that were made of the proceedings that afternoon.

They were deeply grateful to Sir Daniel Hall, and not only themselves but the whole of the public in Kenya and indeed throughout the whole of the African group of territories, for his study of the subject, for the advice he had given and for the encouragement also. Although Sir Daniel Hall had necessarily to devote much of his paper to pointing out the natural difficulties, etc., confronting the settler, yet through it all ran the note that they should not be discouraged and that by research, by team work, and by experiment carefully recorded the undoubted and successful goal would ultimately be reached. He had also paid a great tribute where tribute was due. That was something which ought to be mentioned, because in this country it was sometimes overlooked, when so much was said about what science, Government Committees and public finance could accomplish, that the men who had built up the Colony of Kenya had done so largely because of their courage. Sir Daniel had reminded them of that great human factor. On behalf of the Society he thanked most cordially Mr. Ormsby-Gore for taking the Chair and Sir Daniel Hall for his interesting and important address.

SIR DANIEL HALL, replying to the discussion, spoke first of all of the position of white settlers in view of the possible demands of natives for land. While it must be said that the White reserves had been strictly delimited, that did not amount to more than about 7,500,000 acres in the highlands of the Colony. The native reserves declared amounted to 30,000,000 acres, and as they knew, that land was inalienable and must remain inalienable. It was true that there was also a hundred million acres of land in Kenya unalienated. It was poor stuff, however, and did not lend itself for settlement. It was occupied by nomadic tribes of natives, and some of it was unsafe because of the possibility of raids from Abyssinia. While one did not expect to see the growth of a white population in Kenya going on very rapidly, that area of 7,500,000 acres was fully needed and would support a great many more White settlers. As to the Native reserves, the real problem was that raised by Mr. Hobley in connection with soil erosion: How were those natives to be taught to use their land properly?

He had no time in the course of his paper to deal with this, but one could not exaggerate the serious state of affairs that Mr. Hobley had indicated. He (Sir Daniel) had travelled through the Wakamba country to see it for himself, and there were tracts hundreds of square miles in extent which were being reduced to the state of desert almost—in fact some of it was absolute desert at the present time. The soil and vegetation had gone, down on to the purple grey sub-soil and the rock. This was the result of over-stocking. The Wakamba multiply cattle and goats as a sign of wealth or a medium of exchange, and not for any economic purpose such as milking, except the hides and skins. Goats more especially were the curse of East Africa. This was one of the big problems to-day. These animals had to be got rid of, otherwise the people would starve. Their grazing grounds had gone, and their cultivation grounds were going, and the Government would have to be prepared for very drastic action to save the people from themselves. It was not more land they wanted. If they were given more land, they would make a desert of the whole of Africa They would only rear more goats and cattle.

As to what sort of education the settler wanted, Sir Daniel Hall said they did not want the skilled agriculturist—the man having all the fine technique of the English farmer. What should be the characteristic of the settler was his native qualities as an Englishman—his ingenuity, his inventiveness, his determination, but he would be all the better for a little more knowledge of farming. They had to strike the happy medium. There was too little knowledge of farming in Kenya—far too little. Some of the men whom he wanted to see go out there were men who had got a technical acquaintance with the knowledge of crops, and were not simply amateurs. They wanted men out there in the main who could also be handy men, able to deal with horses and cattle, and do a bit of rough carpentry, and who were not afraid of turning to any job that presented itself. The worst of our public schoolboys was that they had never been up against things. In brief they wanted young settlers, not case hardened in English routine, but who knew how to cultivate the land and how to handle stock.

MR. B. DE M. LEATHES writes:—With reference to the lecture on the problems of the Kenya Settler, I would like to suggest, after close observation over a period of two years in an affected area, that rinderpest and East Coast fever can be, and are carried by the tick bird. I have tried fencing and the usual arsenic methods of tick elimination, but immediately on the arrival of the tick bird the pest has broken out With regard to the mealie bug, I have tried the following with some degree of success in a 20 acre patch—spraying a mixture of wood ash and rain water (2 ounces to 1 gallon) just before flowering and placing each seed when sowing in a small patch of wood ash and red lead—50/50 mixture. These points may perhaps be of interest.

PROFESSOR H. E. ARMSTRONG, F.R.S., writes:—Sir A. D. Hall's address bristles with points of interest inviting comment. Over and over again he calls attention to the need for further knowledge, more often than not using the word "research." He spoke of Rationalisation as the catchword of the day. Research is still more so. I would beg of him to erase it from his vocabulary and never to use it in connexion with agriculture—to so amend the language of his address, if possible. Sir Alfred Ewing probably expresses the feeling of the public towards the word, in an article in *The Listener* (Jan. 29), in an anecdote he tells of a luncheon at Edinburgh to the Imperial Conference of Research Workers in Agriculture. He had spoken, as Chairman, quite nicely, he thought, until he heard a distinguished guest whisper wearily: "May I never hear the word *Research* again as long as I live." No ordinary person knows what the word means—it is thought of as something quite out of the common, which has given us wicked things such as poison gas, it is attached to high-brows talking a lingo which no one can understand. It should be used only very rarely, as it is dangerously near becoming a word of reproach, applicable only to the work done for Ph.D. degrees, though ladies, in public, talk of its lure!

Agriculture is an age-long established science of practice. What it asks for is the most careful and complete observation and study possible of the problems which practice under new conditions presents—in other words, scientific study (inquiry or investigation), which means study made with all the knowledge available for the purpose by competent workers.

The striking fact Sir Daniel Hall brings out is, that the Kenya soils have no special reserve of fertility. Probably this is true of the world at large, apart from a few isolated areas. The fact is one of which we cannot be too mindful. The future of the world almost certainly depends upon the use made of the two fertilisers, phosphate and potash, especially the former. We may well modify Goethe's "Ohne Phosphor, kein Gedanke" to "Ohne Phosphor giebts kein Leben!" The next great war may well be for its possession. It seems to be already impossible to grow wheat in Australia, away from the forest area, without supplying phosphate. Potash is usually to be found in heavy soils; still, even in those it may not be easily available.

Sir Daniel speaks of the falling off in the yield of maize when grown year after year. He attributes this to the diminution of the humus in the soil. From the context I gather that he is thinking primarily of this as a source of nitrogen, not of carbonaceous matter, although he refers to the effect of the latter on the soil. He advocates the production of farm-yard manure or its equivalent. If the question be merely one of growing maize, the Rothamsted experience would seem to show that mineral fertilisers alone should suffice—including ammonia and nitrate, even Urea, among the minerals. Organic manure is unquestionably indispensable in growing green leguminous crops, of whatever kind, I believe. The experience we had in India, in growing Indigo, which I have described in my papers on the subject read before this Society, has to my mind placed beyond all doubt that a leguminous growth is only possible in presence of both organic matter and phosphate, in proper balance. The absorption of nitrogen in the underground nodular growth upon the roots seems only to take place in presence of oxidisable organic matter.

I notice that Sir Daniel makes no reference to *liming*, in speaking of the growth of grass; nor to the great value, indeed the need, of *cultivation*, if grass is to be grown to full advantage. My own observation has convinced me of late of the special value of lime, used as a top dressing to grass: moreover, the need of producing a grass with a high proportion of lime, in order to produce milk, if not also meat, of maximum nutritive value, has to be remembered. If experiments are to be made, the fact that no factor may be varied without regard to the general balance is ever to be remembered.

As to Coffee, I came away from Ceylon convinced that coffee gave out, not as a mere victim to fungus attack but through faulty cultivation, which rendered it susceptible: through phosphatic depletion, in large measure. I warned Rubber growers to bear this in mind. Is not perhaps relatively too much attention being paid in Kenya to fungus attack ? Might not more attention be paid to the cultural conditions—whether these be entirely satisfactory—and to the production of more resistant varieties ? As often as not perhaps, attack occurs because the plant invites it. Cure is always difficult, prevention may be far easier. The agricultural problems of Kenya, indeed of the world at large, need a far broader treatment than is being given to them. The kind of biologist required is a man gifted with a broader outlook than is now connoted by the term The present rush of the schools to teach Biology will not help the least, unless a more definite and broader foundation of scientific method and culture be laid.

NOTES ON BOOKS

EXHIBITION OF WOOD BLOCK PRINTING. The Mansard Gallery. Messrs. Heal's, 196 Tottenham Court Road.

In addition to wood-block printed work of various kinds, Messrs. Heal's are exhibiting paintings by various contemporary artists. This is not the place for a review of fine art, but there is no reason why a fact of interest should not be reported, and one may be allowed to add that in future the Mansard Gallery is regularly going to have paintings on show.

The part of the exhibition with which we are concerned here is well worth visiting on its own account. The art of wood-block printing is æsthetically interesting in itself, and important as an antidote to the excessive mechanisation of the concomitants of modern life. The wood block is valuable for its limitations. To overcome the less formidable difficulties connected with it the artist has to possess a sure vision and to cultivate a peculiar and respectable ingenuity.

The introduction of photographic processes of reproducing pictures had an unfortunate effect on the art of producing books, as the proper relation between the illustrations and the letterpress came to be more and more neglected. The colour, the texture, the whole character of photographed drawings tend to spoil the appearance of the most carefully printed page. Luckily there has been a reaction, and at Messrs. Heal's we can see examples of recently published books illustrated with woodcuts, in which the ideal harmony of text and illustration has been restored.

To name a few of the artists represented here : we find work by John and Paul Nash, Robert Gibbings, Hester Sainsbury, Gill and Ravilious. It is not disparaging David Garnett's talent to say that his books have gained from being decorated with wood-cuts by his wife. The variety of styles shown is remarkable. If anyone doubts that the modern wood-cut has strength as well as refinement, let him look at Mr. Gibbings' " Samson and Delilah." On the other hand, Miss Sainsbury, for instance, shows an interesting development in the direction of a more suave, less " straight from the shoulder " type of work.

The large framed pictures in colour, made from wood blocks, are not altogether successful. The vision is not clear enough, and the compositions seem rather thin.

Coming now to textiles, we have very fine patterns by those staunch designers, Dorothy Larcher, Phyllis Barron and Enid Marx. Here the fallible human touch, through the small irregularities that attend on its expression, operates more agreeably on the eye than does the too perfect finish produced by superhumanly accomplished machinery. But this is not as much as to say that it is not worth improving the design of the great mass of roller-printed stuffs !

Italy has no mouopoly of Varese papers and the like : this cheerful kind of commodity is also produced at home, and the exhibits of Elsie Brown and Alice Hindson show that good designers do not despise a minor but attractive department of the wood engraver's art.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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MONDAY, FEBRUARY 24 Actuaries, Institute of Staple Inn Hall W C 5 p m. Mr L K File, "Disability Benefits in conjunction with Life Insurance Policies"

Electrical Engineers, Institution of, at Armstrong College, Newcastle-on-Tyne 7 p m Informal Discussion

Geographical Society, at the Aeolian Hall, New Bond Street, W 8 30 p m H R H The Duke of Spoleto "The Italian Expedition to the Karakoram"

University of London, at King's College, Strand, W C 4 30 p m Prof E Prestage, "Portuguese Voyages of Discovery and Empire-Building" (Lecture I)

At King's College, Strand W C 5 30 p m Prof R W Seton Watson, "Outlines of British Foreign Policy (1815-80) Lecture VI —The Aftermath of the Crimean War (1855-59)"

TUESDAY, FEBRUARY 25 Anthropological Institute, 52 Upper Bedford Place, W C 8 30 p m Mr F W G Migeod, "Primitive Pictorial Art in Africa at the Present Day"

Civil Engineers Institution of, Great George Street, S W 6 p m (1) Mr C J R Williams, "The Development of Lyttelton Harbour, New Zealand" (2) Mr R F Hindmarsh, "Tyne Commission Quay, North Shields" (3) Mr R C Bristow, 'Cochin Harbour Works

Electrical Engineers, Institution of, at the Hotel Metropole, Leeds 7 p m Mr I C Grant 'The Breaking Performance of High Power Switchgear and of a New Form of Quenched-Arc Switch'

North-East Coast Institution of Engineers and Shipbuilders, at the Cleveland Institution Middlesbrough 7 30 p m Mr J Walton, "Some Large Span Modern Bridges and their Erection"

Philosophical Studies, British Institute of, at the Royal Society of Arts, Adelphi, W C 8 15 p m Dr Joseph Needham, 'Religion and the Scientific Worker"

Photographic Society, 35 Russell Square, W C 7 p m Dr W Payton, "Applications of Photography in Explosives Research'

Royal Institution, 21 Albemarle Street W 5 15 p m Sir William Bragg, "X-Ray Determination of the Structure of Cellulose" (Lecture III)

University of London, at King's College Strand W C 5 30 p m Mr C W Marshall, 'Electrical Transmission by Overhead Lines" (Lecture III)

At King's College Strand, W C 5 30 p m Prof Sir B Pares "Russian History from Peter the Great to 1861 Lecture VI—Napoleon, Paul and Alexander'

King's College (at 40 Torrington Square W C) 5 30 p.m Dr J Krzyzanowski, "Two Modern Polish Novelists Lecture IV—Reymont's Epic on 'The Peasants'"

WEDNESDAY, FEBRUARY 26 Automobile Engineers, Institution of, at the Engineers' Club, Manchester 7 p m Mr I H Pomeroy, "The Double-Six Engine'

Chemical Engineers, Institution of, at Burlington House, W 8 p m Prof Dr W E Gibbs, "The Formation and Growth of Crystals"

Eugenics Society, at Burlington House, W 5 15 p m Dr B P Wiesner, "Hormones controlling Reproduction'

Geological Society, Burlington House, W 5 30 p m Mr S. E Hollingworth, "The Glaciation of Western Edenside and Adjoining Areas and the Drumlins of Edenside and the Solway Basin"

India Society, 21 Cromwell Road, S W. 8.30 p.m Mr H. V. Lanchester, "The Indian Craftsman and His Environment"

Literature, Royal Society of, 2 Bloomsbury Square, W C Ordinary Meeting 5 p m

North-East Coast Institution of Engineers and Shipbuilders, at Bolbec Hall, Newcastle-upon-Tyne 7 15 p m Mr L C Burrill, "Some Notes on Stability"

University of London, at King's College, Strand, W C 5 15 p m Prof J W Allen, "The Social and Political Ideas of Some Representative Thinkers of the Revolutionary Era Lecture VII—Jeremy Bentham."

At King's College, Strand, W.C. 5.30 p.m. Mr A F. Meyendorff, "The Russian Autocracy Its Structure and Characteristic Features."

At the London School of Economics, Houghton Street, W.C. 6 p.m. Mr. J. Mackie, "Office Machinery Lecture V—Accountants' Time Records."

At University College, Gower Street, W.C. 3 p.m. Dr C Pellizzi, "La Lirica del Paradiso." (Lecture VI).

At University College, Gower Street, W.C. 5 p.m Dr R J Ludford, "Cytology in Relation to Physiology and Pathology" (Lecture IV)

At University College, Gower Street, W.C. 5 30 p m Mr I C Gröndahl, "Norwegian Writers of the Present Day" (Lecture III)

At University College, Gower Street, W.C. 5 30 p.m. Mr K G Hunt, "The Librarian's Problem of Catering for the Student"

THURSDAY, FEBRUARY 27 Aeronautical Society, at the Royal Society of Arts, Adelphi, W C 7 45 p m Mr A J Rowledge, Latest Developments of Aero Engines' (Joint Meeting with the Institution of Automobile Engineers)

Electrical Engineers, Institution of, Savoy Place, W C 6 p m Captain P P Eckersley, 'Broadcasting by Electric Waves" (Faraday Lecture)

L C C Geffrye Museum, Kingsland Road, E 7 30 p m Mr Philip M Johnson, "Timber Architecture in Old Houses and Churches

Metals, Institute of at the Chamber of Commerce Birmingham 7 p m Mr R W Bailey, "Creep of Metals at High Temperatures

Royal Institution, 21 Albemarle Street, W 5 15 p m Mr J B S Haldane Some Problems of Genetics"

University of London, at King's College, Strand, W C 5 30 p m Monsieur G Lafourcade, 'Baudelaire ses Origines Litteraires son Influence' (Lecture II)

At King's College, Strand, W C 5 30 p m Mr H W Steed Masaryk and Central Europe Lecture II—Between Philosophy and Politics"

At University College, Gower Street, W C 5 15 p m Prof J E G de Montmorency, "Momentous Law Suits and Trials in Various Countries from Classical to Modern Times" (Lecture V)

At University College Gower Street, W C 5 30 p m Prof R W Chambers "Early Tudor Biographers" (Lecture I)

Victoria and Albert Museum, South Kensington, S W 5 30 p m Mr E G Millar, "The Louterell Psalter and the Psalter and Hours of John, Duke of Bedford

FRIDAY FEBRUARY 28 Electrical Engineers Institution of at the Electricity Showrooms, Oxford Street, Swansea 6 p m Mr I C Grant 'The Breaking Performance of High Power Switchgear and of a New Form of Quenched Arc Switch"

Junior Institution of Engineers, 39 Victoria Street, S W 7 30 p m Mr J Rowcroft, 'The Design of Electrical Machinery'

Royal Institution, 21 Albemarle Street, W 9 p m Prof G I Taylor, 'A Tour in the East Indies"

University of London, at the Imperial College of Science South Kensington, S W 5 30 p m. Prof C Stormer, 'The Mathematical Theory of the Polar Aurora" (Lecture I)

At King's College, Strand, W C 5 30 p m. Dr F E Budd, "The Sources of Measure for Measure"

At King's College, Strand, W C 5 30 p m Prince D S Mirsky, "Russian Literary Criticism. Lecture VII —The Metaphysical Critics (1890-1920)"

King's College (at 40 Torrington Square, W C) 5.30 p m Dr O Odlozilik, "Outlines of Czechoslovak History—II Lecture I—The First Hapsburg Rulers."

At the London School of Economics, Houghton Street, W C 5 p.m Mr R. G Hawtrey, "The Relation of International Trade to Wages" (Lecture II).

At University College, Gower Street, W C 5 p m Mr G P Wells, "Comparative Physiology" (Lecture VII)

At University College, Gower Street, W.C. 5 30 p.m Prof E Gilson, "L'Idée de Dieu dans la Philosophie de Descartes." (Lecture I)

SATURDAY, MARCH 1 .L C C Horniman Museum, Forest Hill, S E 3 30 p m Dr W G Ivens, "The Solomon Islands and their People."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Mr W Rothenstein, "19th Century Painting in France and England." (Lecture II).

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4032 *FRIDAY, FEBRUARY 28th, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

Newstead Abbey.—Some years ago there was a considerable controversy as to the most suitable place for a memorial to Lord Byron. Westminster Abbey was discussed and abandoned. Byron was buried under the Chancel arch of Hucknall Church near Newstead, his ancestral home in Nottingham. The proposed memorial screen in the Church never materialised. A Fellow of the Royal Society of Arts, Sir Julien Cahn, of Stanford Hall, Loughborough, is negotiating the purchase of Newstead Abbey and its gardens for acceptance by the nation through the Royal Society of Arts. He has in mind that the Society should appoint Trustees, and make all the necessary arrangements for some ceremony on handing over his gift at Newstead in June. Sir Julien Cahn has gone to the Argentine with his cricket team, but he has committed the negotiations, pending his return, to Mr. Sydney Walton, another Fellow of the Society. The Byron relics, by courtesy of the present owner, will be left in the Byron rooms, and remain open to the public. Fuller particulars will be forthcoming shortly. Mr. J. C. Squire, writing some years ago in regard to the proposal for a memorial to Byron said: " Byron might well, we know, have written a jocular canto about the Abbey, but never about Newstead, to which, after all his fevers and warfare, he returned at last to take that rest that was his ultimate desire."

The National Trust.—The National Trust, or to give it its full title—The National Trust for the Preservation of Places of Historic Interest and National Beauty—gave a conversazione at the Mansion House on Monday evening. The great hall was a dignified setting for a memorable occasion. With all due gratitude for a very pleasant and interesting evening, we would suggest that all meetings of this kind connected with Societies suffer from a certain coldness. The object of a conversazione is for social intercourse. A band would have brightened the atmosphere and attracted the young, whose interest in the preservation and beauty of England is so essential. The music was so good that it could not have the restful attention it warranted. The Belgian Ambassador and Lord Crawford made appreciative reference to the increasing importance and splendid work of this great and essential Society. No words could exaggerate its value. Mr. Bailey fittingly spoke of the untiring work of Lord Crawford—the figurehead in all efforts to save the beauty of England. The Treasurer of the Trust, in proposing a vote of thanks to Lord Crawford, spoke of the motor car as the one enemy they had to combat. It was a race between their work and the car's ever-increasing power. You cannot stop the increase, but you must educate the owners and make them behave, not by legislation but the pressure of public opinion. The conditions of our towns have created the yearning for the delights of the country. We cannot expect wholesome country manners to emerge from these conditions. When we have cleansed our slums and insisted on the near suburbs of London being tidied up by their municipal authorities (who have the power), we may see some reflection of such better conditions in the country we are trying to keep inviolate. Meantime, this great National Society stands ready to receive any supreme treasures of scenery or building that are so unique that they must not be spoiled.

Charing Cross Bridge.—A letter was addressed to the Royal Society of Arts by Sir Robert Perks with regard to the question of the position of the station and its convenience to the public. They appointed a small sub-committee to deal with the whole subject. Sir George Humphreys very kindly allowed one of the Council to see all the plans, so that they would be in a position to get the L.C.C.'s point of view. They were proceeding to enquire into the architectural side when a dramatic event happened, namely, the resignation of Sir Edwin Lutyens, who has been advising the L.C.C. for a long while. This situation raises the whole question of the relationship of the architect to the public, and it is especially interesting that this should have happened the same week that Mr. Hilton Young's Bill has passed the second reading, but it is rather a question whether this is far reaching enough to affect the educated public. For a long time the architects have been refusing to face the changes and problems which have arisen in building to-day, and they have taken no steps to design and control the new developments. Sir Edwin Lutyens has influenced the manner of English architecture for many years, and he is obviously the leader of the profession in England. His resignation is significant, especially at the moment when the Institute is proposing to re-house itself suitably. We trust Sir Edwin will continue to advise the L.C.C. on the architectural shaping of the new Charing Cross Bridge and its alignments. The Gordon Hotels could now have the advantage of Sir Edwin's services to complete his scheme for Park Lane.

Exhibitions.—Antoine Bourdelle's show at the Leicester Galleries is on a very big scale—to him we may apply without hesitation the word " great." He was assistant to Rodin for some time, but he does not seem to have come greatly under his definite influence. He has a tremendous range both in subject and quality, and a great sense of dramatic form; sometimes he is almost too consciously theatrical, but his great vitality seems to carry him triumphantly through every experiment, and make each a perfect expression of its own type. Antoine Bourdelle died last year and this exhibition is a splendid memorial of his work.

Books.—On Wednesday, Mr. D. S. MacColl gave an exceedingly interesting lecture on the great, but alas, little known English artist, Alfred Stevens. As a nation we are always having to defend ourselves against charges of being inartistic, and looking at the reproductions of Alfred Stevens' work the other night, one began to think they were justified, if we could not give wider appreciation to such a master of painting, sculpture, and architecture. All his life he struggled against poverty, and what was worse, the stupidity and lack of understanding of those for whom he was working. The story of his early life and later the competition for the design of the Wellington Memorial was most vividly told and illustrated. Drawings were kindly lent by Mr. Alfred Drury, and Mr. Archibald Russell, one of which was Stevens' original sketch for the memorial in St. Paul's. Mr. D. S. MacColl, much of whose criticisms of Art should be collected and published in a representative volume, might with real advantage publish the final work on this great artist in book form. Mr. Hugh Stannus' book is long out of print, and also Sir Walter Armstrong's; neither in any case meets the need. The time is particularly appropriate for such a study as Mr. MacColl could give the country.

In view of Professor Elliott's lecture for the Society on March 12th, his book on " Human History," which is published by Jonathan Cape this week, is attracting great interest. We hope to deal with this important contribution to History before the lecture.

NOTICES

NEXT WEEK

MONDAY, MARCH 3rd, at 8 p.m. (Cantor Lecture). ALFRED B. SEARLE, " Recent Improvements in Methods of Brick-making." (Lecture III).

TUESDAY, MARCH 4th, at 4.30 p.m. (Indian Section). T. M. Ainscough, C.B.E., H.M. Senior Trade Commissioner in India and Ceylon, " British Trade with India." GEORGE MASTERMAN GILLETT, M.P , Parliamentary Secretary, Department of Overseas Trade, will preside.

WEDNESDAY, MARCH 5th, at 8 p.m. (Ordinary Meeting). PROFESSOR ARTHUR R. LING, M.Sc., F.I.C., School of Malting and Brewing, University of Birmingham, will preside.

CANTOR LECTURES

MONDAY, FEBRUARY 24th, 1930. PROFESSOR HENRY E. ARMSTRONG, Ph.D., LL.D., D.Sc., F.R.S., in the Chair. MR. ALFRED B. SEARLE delivered the second of his course of three lectures on "Recent Improvements in Methods of Brickmaking." The lectures will be published in the *Journal* during the summer recess.

DOMINIONS AND COLONIES SECTION

TUESDAY, FEBRUARY 25th, 1930. LIEUT.-GEN. SIR WILLIAM FURSE, K.C.B., D.S.O., Director of the Imperial Institute, in the Chair. A paper on "Scientific and Industrial Research in the British Empire," was read by DR. ARTHUR W. HILL, C M.G., Sc.D., F.R.S., Director, Royal Botanic Gardens, Kew. The paper and discussion will be published in the *Journal* at an early date.

PROCEEDINGS OF THE SOCIETY

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THIRTEENTH ORDINARY MEETING.

WEDNESDAY, 19TH FEBRUARY, 1930, at 8 P.M.

MR. P. MORLEY HORDER, F.S.A., in the Chair

THE CHAIRMAN, in introducing the lecturer, said that Dr. MacColl's activities in the world of art had been so varied and constructive that it was not necessary for him to do more than say how honoured the Society was in having him on the platform that evening, to tell the Society about one of the greatest artists this country had produced. He always felt that in any other country than England such opportunity would have been given to Alfred Stevens that his contributions to the world of art might well have been compared with those of Michael Angelo. As a painter, sculptor, and architect, it was an immense loss that he was not given better opportunities. Dr. MacColl would appraise his work and his ultimate place in creative art, and no one could more adequately discharge such a task. The speaker's only regret was that, owing to the date and circumstances, Dr. MacColl had so inadequate a Chairman to mark the present occasion. He (the speaker) had been, and was likely further to be, involved in the controversy which had arisen over the new hotel erected on the site of Dorchester House in Park Lane, where Alfred Stevens did so much fine work. He was sure that the constructive mind of Stevens would have responded to any new interpretation in design and material, and every thinking person must recognise that new conditions did demand new interpretations; but, at the same time, any such break in a street like Park Lane, which had a certain historic beauty of its own, was greatly to be regretted. Such streets should not be made experimental.

The following is a summary of the paper then read :—

ALFRED STEVENS—SCULPTOR, PAINTER, ARCHITECT

By D. S. MACCOLL, M.A., D.LITT., LL.D.

The lecturer described Stevens as the response to a long aspiration of English art, one to which Reynolds gave expression in his last Discourse, devoted to

Michelangelo—the hope that there might arise a worthy follower in this country of that " divine man." That claim is apt to be met with the objection that such a revival, even if possible for a modern, must be an anachronism. But we must distinguish between the personal side, the range of imagination or emotion in a master and the universal, what he added to the province of plastic design. Stevens, more akin in temper to Raphael among ripe Renaissance masters, was no shallow imitator, but one who had grown up through a study of the primitive Florentines to their culmination, and who became a true inventor at that altitude. Equipped to design with equal readiness in painting, sculpture or architecture, he returned from Italy in 1842, the most thoroughly educated artist this country has seen, and its greatest plastic genius. He showed his originality, moreover, by working in the teeth of the romantic, medievalistic movement, which inspired the more feminine charm of the pre-Raphaelite group and the Gothic revivalists.

Born in 1817 at the rather noble country town of Blandford, and son of a painter of signs, he used brushes and colours with precocious skill at the age of eight, and with the aid of Samuel Best, rector of Blandford St. Mary, was despatched to Italy with a capital of £60 at sixteen. After eight years' pupilage there he returned, hoping to live as a painter, but with no encouragement in that direction, nor success in his competitive designs for the Houses of Parliament frescoes or for the architecture of Government offices in Whitehall. The remarkable portraits of friends that he executed in Italy and England were illustrated and described. To 1849 belongs the project for the bronze doors of the Geological Museum, which shows what he had learned and was capable of. This drawing, sent to the Royal Academy, his one attempt to exhibit there, was rejected. Other work for public buildings and private houses was briefly referred to.

After interludes of employment as teacher in the Somerset House School of Design (beginning of the Arts and Crafts' movement) and for Messrs. Hoole, at Sheffield and other industrial firms, such as Messrs. Benham and Messrs. Minton, he obtained, in 1856, his great opportunity through the competition for a national memorial to the Duke of Wellington in St. Paul's. Placed sixth on the list of awards, his model ultimately obtained the prize because it alone was fitted for its place. The rest of his life was passed in wrestling with the execution of his design, hampered as he was with the task of producing a full-size model, and the inadequacy of the funds provided. He died in 1875, with the monument incomplete in some details, and the equestrian statue which was to crown it debarred by the Dean's opposition. His grasp of the conditions, imaginative and architectural, was analysed, and his rare power of " Dramatic allegory " and plastic grouping dwelt upon. The development of his ideas was described and the addition of the equestrian figure in our own time, a duty in which the lecturer was aided by the late Lord Hardwicke, the present

Archbishop of Canterbury, and Mr. Harold Hodge, then editor of the *Saturday Review*.

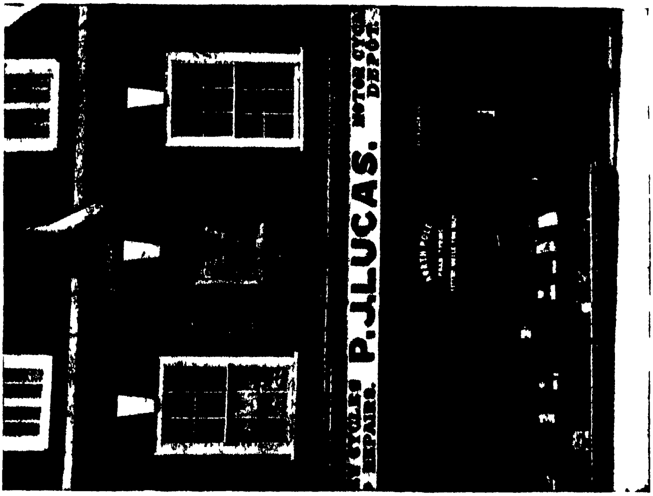
Another scheme for the decoration of St. Paul's went no further than projects, the painting of the Dome with an Old Testament, and the sculpture of figures for the drum : models and studies only exist. The figures of Prophets for the spandrels of the arches, however, were carried out, in a re-handling of Michelangelo's themes, reproduced, unluckily, in the degraded mosaic tradition of the time.

A fine project for a monument of the 1851 Exhibition, crowned by a figure of Queen Victoria, was unsuccessful in winning the competition and exists only as a model.

Concurrently with all this Stevens engaged himself on another decorative scheme, in Dorchester House, built for Mr. Holford by Lewis Vulliamy, and recently swept away. This embraced a fine chimneypiece for the dining-room, with its caryatid supporters (his only figures in marble), a buffet, minor frames, and doors with wood roundels, carved by his own hands. A second chimneypiece was carried out for the drawing-room. For seventeen years the magnanimous owner was kept out of his dining-room by the fastidious and single-handed operations of the artist. For the ceiling an unfinished painting, the *Judgment of Paris*, and fragments and studies for the coving, *The Wrestling of Corineus with the Giant Goemagot*, from British mythology, alone survive.

Two matters of topical interest were touched on in the course of the lecture. One was a sketch plan representing Stevens' ideas for a lay-out of Charing Cross, new approach roads, and a Hungerford Bridge. Stevens, like Wren, would have been ready to plan a new London, and design its public buildings, though with his fastidious, dilatory ways one lifetime would have been too short for the task. But the sketch shows what we might have had if a big mind had been permitted to apply itself to a problem, the official solution of which, accepted by the House of Commons while the lecture was in progress, will saddle London with a botch and a by-word. Stevens gave axial symmetry to a re-plotted Trafalgar Square, with a crescent of public offices and a radiation of roads. Behind the National Gallery he projected a series of museums, with gardens and room for extension. On either side of these new thoroughfares would have run to Oxford Circus and the British Museum.

The second point was the future of the Dorchester House site. Vulliamy's Italian palace has gone the way of other great houses in a period of Palace Hotels and barrack flats, and a pile of that order is projected. It is the work of an eminent engineer without the co-operation of an architect, and its ferro-concrete structure will be an unhappy intrusion of the experimental methods now in use for factories upon the brick and stone proper to London streets. The preservation of some part of Stevens' work has been secured by the action of a Fellow of this Society, but the fate of the chief chimneypiece is still in suspense. It will be pitiful if it does not find a place in a new building, if possible a public one.



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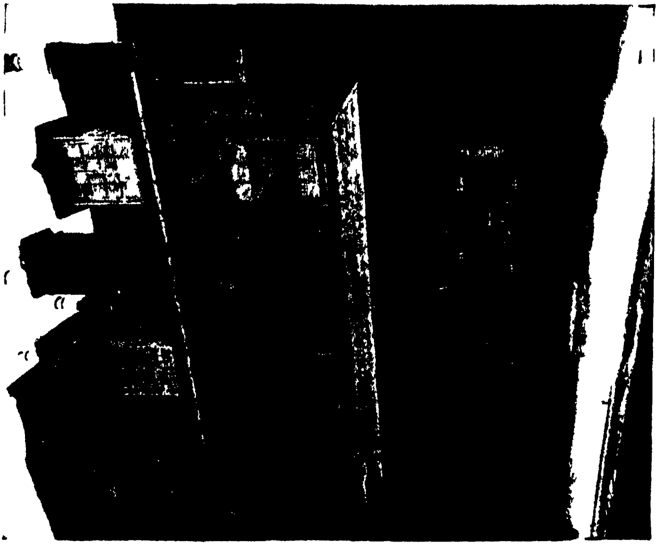
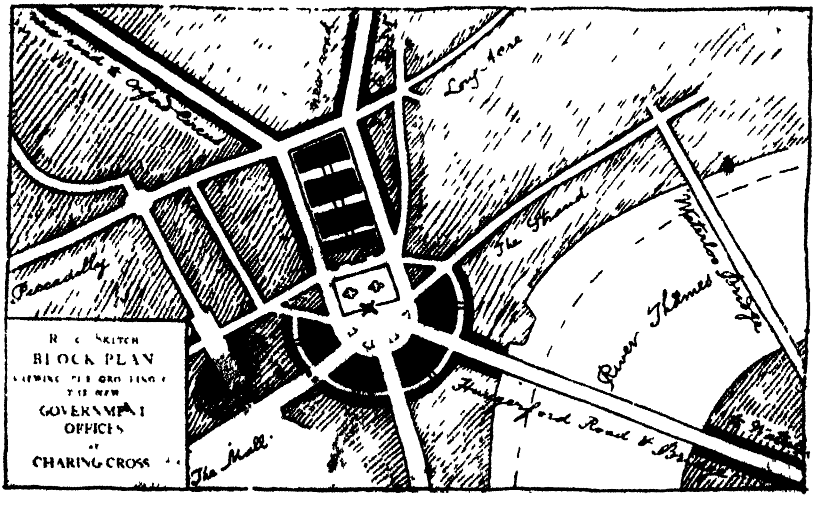
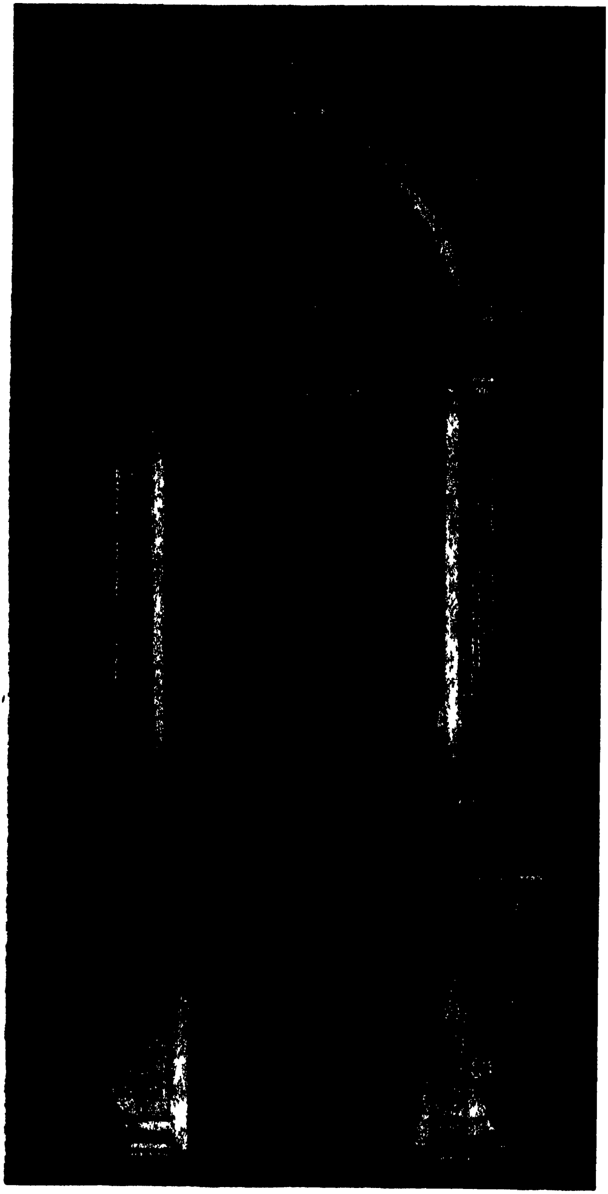


Alfred Stevens Birthplace

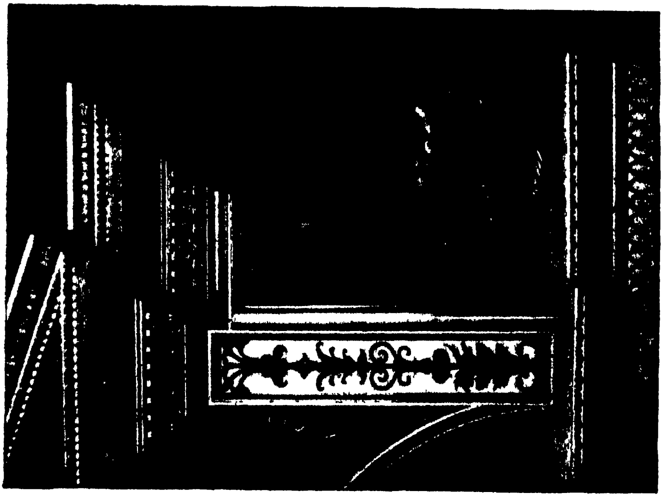
Alfred Stevens' portrait of the Vicar of Blandford St. Mary



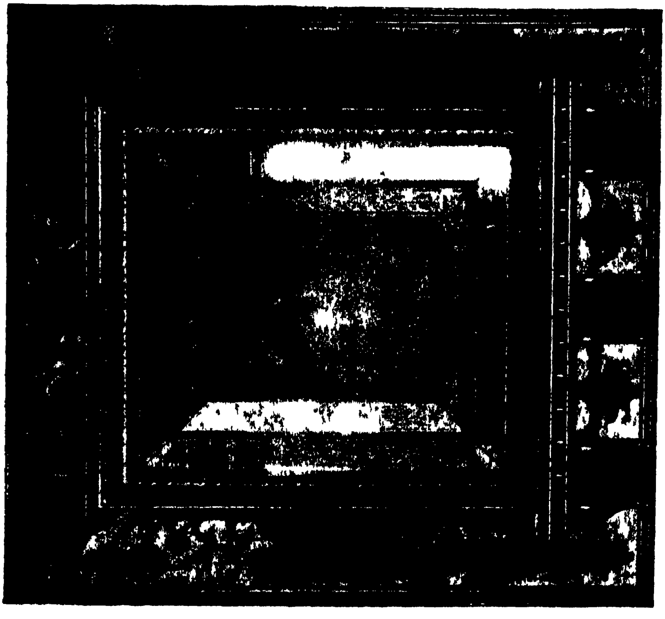
Fireplace from Dining Room Dorchester House.



Fireplace from Drawing Room.



Detail of Sideboard from Dining Room



One of the Mirrors from Dining Room

DISCUSSION

Mr. H. V. Lanchester, F.R.I.B.A., said that he appreciated fully the enthusiasm with which the lecturer had spoken of the greatest artist at any rate of the last century. He himself could speak with a similar enthusiasm, though not with equal ability, of the work of Stevens. Recently, he thought, his genius had become more widely appreciated. It did not matter, of course, looking across the centuries, whether the appreciation of a man's genius came a few years sooner or later. He wished to add that the drawings left to the Royal Institute of British Architects were now being sent round the country, and all those who saw them were most anxious that they should go from one town to another in order that as many as possible might appreciate them. There was some hope, therefore, that the brilliant work that Stevens did would influence the rising generation. While it might not be possible to hope for another Stevens, some shadow of his genius might fall upon the young men growing up to-day. He had much pleasure in proposing a vote of thanks.

The vote of thanks was put from the Chair and carried unanimously.

Modern Street Architecture in London

After Mr. Morley Horder left the Chair, Mr. Shaw Desmond, a member of the audience, asked that the meeting should pass a resolution on the subject of the changes taking place in Park Lane. The meeting was therefore reconstituted, with Dr. D. S. MacColl in the Chair.

Mr. Shaw Desmond said that he felt impelled, though with some reluctance, to open a somewhat informal discussion on the question of Dorchester House. While not an architect, he was not, of course, quite ignorant of the extraordinary work of Stevens, and he felt, however irregular it might be, that advantage might be taken of the occasion when so many lovers of Stevens and of art were present, to make the voice of the Society of Arts heard in respect to the discussion which was taking place over the question of the changes in Park Lane. The previous Saturday, on returning to London after adjudicating at the Sheffield Play Festival, he found a London evening newspaper which announced " London architect refuses to build modern American hotel on site of Dorchester House." This alteration of the character of Park Lane was a national matter. It was not a matter for the Londoner alone, but concerned every Englishman, and, being an Irishman himself, he must add every Irishman too. London was a cosmopolitan city, in which all types of people found a common interest. He had been familiar with Park Lane for many years. The old houses that used to occupy that thoroughfare had certain disadvantages, but they had something English, of the Victorian period, that suited the character of the adjoining Hyde Park perfectly well. Now, to his horror, he found Park Lane becoming a very poor and weak edition of modern New York. In another six years Park Lane would repeat, on a very much inferior scale, the New York character. The sky-scraper in itself was one of the most beautiful buildings erected in New York. That was not true of all sky-scrapers—the " Flat Iron building" in particular, was ugly—but there were sky-scrapers which were exceedingly pleasing. On looking at some of them he had felt that they represented work of a very high type indeed, that they had something of the mystery which great architecture ought always to have. He found himself expecting troglodytes and fairies and all kinds of gnomes to come out of those windows. But when it came to Park Lane, he felt that the surroundings were entirely unsuited to the erection of weak replicas of the buildings which had their place and beauty in New York. The reason why a skyscraper came to be erected in the American city was due to the restricted space on Manhattan Island. In London, where the same necessities did not prevail, if architects started putting up building on building, the city would become a strongly Americanised conglomeration, with little of old England about it. It was for this reason that he applauded the action which Mr. Morley Horder had taken in connection with Dorchester House. Mr. Morley Horder was one of the few Don Quixotes left in modern society, and he had made a splendid gesture in the face of a rather brutal invasion of American ideas. The speaker wished to make it plain that he did not even know the names of the people connected with the re-building of Dorchester House, but he felt strongly that if some protest were not made now by a number of people whose opinion mattered in cases of this kind, it would be found that American buildings were being run up in increasing numbers year after year. Finance would rule the roost, cubic capacity and maximum rentals only would be considered, and the spirit of architecture would perish. He wanted the matter to be taken up in Parliament, though he had little faith that it would receive there the attention from the architectural point of view which it deserved. He himself was filled with a great regret, when he thought of those old buildings in Park Lane, with the beauty and the sense of proportion which they embodied, being sacrificed to the enormities and monstrosities which were rising up on their sites. He felt that it was a calamitous movement, and he hoped the Royal Society of Arts would serve as a spear-head of the protest which was developing among people who valued the spirit of art. He hoped that some formal resolution might be permitted. Mr. Morley Horder was a brave man, and a great Englishman, with some of the finest qualities of the English race, and it would be a shame if the Society left such a man to stand alone in his protest.

Mr. H. V. Lanchester, F.R.I.B.A., desired to support the remarks made by the previous speaker. He only wished that something of this sort could have been said and done while Dorchester House was still in existence. A fight was waged over Dorchester House and lost. Nothing equal to that building could under any circumstances take its place ; the conditions had gone by when work like that of Alfred Stevens could be secured for such a building. With regard to the high buildings now being erected, there was protection to some extent as a result of building bye-laws from the conditions which obtained in New York. But this protection went only to some extent, because on the ground of these buildings being opposite an open space, a very much greater height was permitted in Park Lane than would be permitted elsewhere. But even if the maximum at present permitted were reached uniformly, the streets would become impassable and London would be an almost uninhabitable city unless there was a much greater extension of tunnels underground. It was quite practicable to frame regulations by which the mass of the buildings—and it was a question of mass as well as of height—could be properly limited, and limited without imposing any drastic disability on the owners. Such regulations ought to be put into force. If the present permissions went on, London would become not only ugly but uninhabitable.

The Chairman was a little doubtful whether any formal resolution should be taken at that meeting , it was rather a matter in which the Society should act through a committee.

Mr. G. K. Menzies mentioned that the Chairman of the Council of the Society was addressing a letter to the Royal Fine Art Commission asking them to take action in this matter if possible. He thought that was probably as much as the Society could do at the moment.

Mr. Shaw Desmond suggested a short resolution which he had drafted, his purpose being that it should engage the attention of the press, because the press was of enormous importance in this particular matter. His resolution was as follows :—

> " That this meeting of the Royal Society of Arts registers its protest against the erection upon the site of Dorchester House of a hotel on the American model as tending to destroy the amenities of London."

Mr. E. E. Pither expressed his willingness to second this resolution, though he thought that it would be of more value if it did not refer to one particular spot. London was being spoiled in several directions by the same influences.

Mr. Shaw Desmond agreed that the resolution might be made of a more general nature, and he said that if the meeting would agree to a resolution along those lines, he and the seconder would afterwards put it in suitable form.

The Chairman mentioned that even in New York it was being discovered that the sky-scraper needed reconsideration, that if buildings of that height were put up, open spaces must be provided around them. The case of Manhattan Island was a very special one. In connection with the whole subject, it was not only the question of size and shape which came in, but also the question of material. Ferro-concrete had its uses, but whether it was most appropriate for London street architecture of the domestic kind was open to question. In his opinion there was nothing to equal the old brown brick of the London streets with Portland stone dressings.

Mr. Pither also pointed out that in New York the sky-scraper buildings were made to taper, whereas in this country they were being made in huge flat blocks, and on that account the structure was more obnoxious.

The Chairman added that there was a regular zoning law in New York which actually designed the buildings independently of the architect. With regard to the resolution, he thought that it would be better if it were referred in the first place to a committee of the Society to consider the whole question of the erection of such buildings.

Mr. Shaw Desmond and his seconder agreed to this course, and a resolution to this effect was put to the meeting and carried unanimously

Afterwards the precise terms of the resolution were drafted as follows :—

> " That this meeting at the Royal Society of Arts recommends that the Society form a committee for the purpose of taking into consideration the whole question of the demolition of fine architectural buildings to make room for the erection of lofty un-English buildings of an unsightly nature not suited to the surroundings amidst which they are erected."

The meeting then terminated.

OBITUARY

ALAN A. CAMPBELL SWINTON, F.R.S.—The Society has sustained a very severe loss by the death of Mr. Alan A. Campbell Swinton, which took place at his house in Chester Square on February 19th, at the age of 66. He joined the Society in 1894. In 1896 he read before it a paper entitled "Röntgen's Photography of the Invisible." This was the first occasion on which Röntgen's startling discovery had been publicly described in this country, and the interest taken in the meeting was so great that as many people had to be turned away as could be accommodated in the lecture hall. The Society's silver medal was awarded to him for this paper. In 1912 he was elected on to the Council and he continued to serve on it almost continuously up to the time of his death. He acted as Treasurer in 1920-21, and had the unusual distinction of being elected Chairman for two periods, 1917-19 and 1920-22. In 1922 he was nominated by H.R.H. the President a Vice-President of the Society in recognition of the valuable services which he had rendered to it.

During his chairmanship of the Council the Society, whose lease of its house had expired some years previously, was threatened with the alternatives of purchasing the premises or paying an enormously increased rent. The price asked for the freehold was £42,000. Mr. Campbell Swinton determined that an effort ought to be made to raise the money, and as the result of a talk with some of his friends the fund was started with contributions ot £2,500 from Sir Charles Parsons, £1,000 from Sir Dugald Clerk and £1,000 from Mr. Campbell Swinton himself. Later on an anonymous gift of £30,000 brought the Council within sight of their goal, but to Mr. Campbell Swinton the thanks of the Society are due for having initiated the fund.

For many years Mr. Campbell Swinton was a very frequent attendant at the Society's meetings, often taking the chair and speaking in the discussions. In 1917 he gave a course of Juvenile Lectures on "Electricity and its Applications" which were illustrated by a series of brilliant experiments. He also delivered four inaugural addresses as Chairman, "Science and its Functions" (1917), "Science and the Future" (1918), "Wireless Telegraphy and Telephony" (1920) and "Wireless Telegraphy" (1921). In the third of these he startled the incredulous by prophesying that "some day we may have the Prime Minister, or even the Monarch himself, addressing by word of mouth, and at one and the same time, all the different parts of the British Empire." Ten years ago this seemed a wild prediction, but to-day it is a matter of course.

In 1924 he read a paper entitled "Personal Recollections of some Notable Scientific Men," in which he had something to tell of most of the great scientists of the last half-century.

Alan Archibald Campbell Swinton was born in 1863. After being educated in Edinburgh and abroad he spent some years (1882-7) in the Armstrong Works at Elswick, and then settled in London as a consulting engineer. Besides being responsible for designing and carrying out various electric lighting and traction works he became connected with the commercial side of electric manufacture as chairman of Messrs. Crompton & Co., and director of several supply undertakings. He was associated with Sir Charles Parsons in the development of the steam turbine, and was a director of the Parsons Marine Steam Turbine Company.

Mr. Campbell Swinton always took the keenest interest in fresh developments of electrical physics. As has been already mentioned, he was one ot the first in this country to study X-rays, and he was a pioneer worker in wireless telegraphy. At a very early date he had installed a wireless telephone between his house in Chester

Square and his office in Victoria Street. In 1915 he was elected a Fellow of the Royal Society, to which he contributed £1,000 to form the nucleus of a General Purposes Fund. He was president of the Röntgen Society in 1911, and of the Radio Society of Great Britain in 1913, Vice-President of the British Photographic Research Association, Chairman of the British Scientific Instruments' Research Association, and a member of the general board of the National Physical Laboratory. For some thirty years he was a well-known and popular figure at the Athenæum, from which he wrote many excellent letters to the press on scientific subjects.

Thanks largely to his position in life and to his genial character, Mr. Campbell Swinton had numbered amongst his friends nearly all the most eminent men of science during the last fifty years, and he had a remarkable collection of their photographs, all taken by himself. Shortly before his death he had completed his autobiography, which is now almost ready for publication. It will be illustrated by many of these photographs, which will have a very special interest for the student of the history of science.

SIR ALFRED HENRY ASHBOLT.—Sir Alfred Henry Ashbolt died at Hobart, Tasmania, on January 24th, at the age of 60. Born in Christchurch, New Zealand, in 1870, he was educated in his native town and at Wellington. After being articled as a chartered accountant, he went to Tasmania and entered the firm of H. Jones and Co. (now Henry Jones Co-operative, Limited). This firm had large fruit interests, which extended beyond Australia to South Africa and California, and Ashbolt gained such a wide and varied commercial experience that when the post of Agent-General for Tasmania in London fell vacant in 1919, he was invited to fill it. He held the office from 1920-24 with great success, and received the honour of knighthood on his retirement.

When in London, Sir Alfred Ashbolt took a deep interest in the Royal Society of Arts. In 1920 he read a paper here on "Industrial Developments in Australia during and after the War," for which he received a silver medal, and in 1921 he read another entitled, "An Imperial Air Service." He also attended many meetings of the Society, frequently taking part in the discussions, and he was a useful member of the Committee of the Dominions and Colonies Section.

BRITISH INDUSTRIES FAIR AT OLYMPIA.

We cannot expect anything less than ordered profusion from a Fair advertising this great Empire. On entering, just as, say, at the Italian Exhibition, one's head is inclined to reel. Where is one to look first? But here the resemblance to the Italian Exhibition stops. For wherever we look at Burlington House we see something interesting, while at Olympia our reflections may be interrupted by a mechanical lion swinging its mane from side to side and making a noise like a sick cow.

Now we are brought up to believe that everything in Nature has a purpose. The most exotic insect, or so nurse declares, has a place and a function in the great scheme of things. We make up our minds that even the gnat, in being a nuisance, is performing an honourable office. But when we grow up doubts are born and multiply; and so it is rather with our attitude towards modern enterprise.

For we begin by presuming obediently that every gadget is worth its lubricant; there must be some demand for it—and demand is sacred *per se*—let there then be a supply. Later, we wonder.

Yet one cannot help feeling that our artists and craftsmen are in some ways more happy when applying their talents to the output of commodities with no artistic pedigree, commodities only distantly, or not at all, related to time-honoured forms of expression, than when they are asked to respect tradition and mix beauty with utility. *Happy*, but not, alas, as the Romans were, who built bridges and aqueducts and made them beautiful by instinct as well as simple and enduring by design.

True, bridges and aqueducts are not gadgets, but our revolving office chairs and our disguised loud-speakers are not more handsome than our railway stations.

As to Olympia, it is likely that the Birmingham part of the Exhibition is the more impressive. Our railway stations may not be very fine, but our railway engines are; and nobody could accuse Messrs. Rolls-Royce, the soundness of whose products is almost proverbial, of joining in the conspiracy to fill the world with ungraceful lines and disgraceful noises. But for heavy industries it is to Birmingham that we would have to repair.

At Olympia we walk almost straight into the Dominions section organised by the Empire Marketing Board. Clever dioramas built by the Imperial Institute give us vivid glimpses of various typical places of interest over the five continents where the Flag flies. Little automatic cinemas rattle away at the same time, showing us, for instance, how elephants benignly join in the business of Empire building.

The Textiles shown at Olympia are on the whole disappointing. A great deal of trouble has certainly been taken, but the level of design is a low one. Nor are the colours that we see of very attractive hue. Modern science has managed to produce some remarkably repellent greens.

Tweeds are, as nearly always, agreeable; mackintoshes, at least convincing. Rugs—well, a newspaper poster reminds us that "Dursley sends rugs to Mecca." This was not intended to be read as a cynical comment on the march of progress, but a glance round the stall where rugs similar to those exported are on view will lead to our fancying Burton turning in his grave.

Messrs. Rannochs and Messrs. Stanley Auld have some interesting curtains and nets to show; we would not be dismayed by a poster declaring that they are sent by their makers to Brussels or Paris.

Hats—Messrs. Christy's little historical collection is delightful. Why has Britain lost her lead in hats? The most serviceable modern headgear is foreign born; the homburg, the beret and the black soft hat, this last perhaps the most generally pleasant and useful of all.

Furniture at Olympia is not choice. Some of it is ingenious, and we see sofas turning into beds, hey, presto! without a squeak of the mechanism. But these broad cupboards of wood burnished to an incredible degree of luminosity, these squat and ungainly sideboards, these shattering improvisations in grain, bear witness to a mistaken policy as well as to lack of artistic sensibility.

The Pottery and Glass exhibits are far more creditable. Here there is plenty of sound, every-day ware, unpretentious and even beautiful. The New Chelsea Porcelain Company has a good show; among the most interesting glass fabricators are Messrs. Walsh and Messrs. Stevens and Williams. The cloud-glass of Messrs Davidson is on a dangerous border-line between good taste and mere romanticism. For both this, and the pearly plate of the Irish firm of Belleek, Fermanagh, manage to "come off."

The vogue for nursery-like effects in art and craft certainly persists; this explains the work of the Devonshire Potters and the Bough Pottery, Edinburgh. Several important firms merely supply the unfortunately considerable demand for what Roger Fry calls "opifacts" when they turn out great, ugly luxurious pots covered, apparently, with festering weals and streaming with blood. A macabre taste; Trimalchio showed a sense of humour in his ostentation; his descendants, or rather, they who uphold his tradition, are wanting in this valuable though overrated quality.

NOTES ON BOOKS.

THE BRITISH JOURNAL PHOTOGRAPHIC ALMANAC, 1930. Edited by George E. Brown, F.I.C., Hon. F.R.P.S. London: Henry Greenwood & Co., Ltd. 3*s*. net.

The "B.J." Almanac for 1930 fully maintains its customary standard. Mr. Brown, in recognition of the fact that the present volume is the twenty-fifth which he has edited, has contributed a collection of reminiscences, largely personal, which will amuse and entertain a wide circle of readers. Other items of unusual interest include an article entitled "Gadgets in Pictures," by David Charles, in which a great number of neat devices and methods are illustrated by excellent photographs; and a description by the late Joseph N. Pearce of the remarkable lighting procedure which enabled him to obtain his unexampled series of interiors. In addition to many fine photogravure reproductions, there are also the usual excerpts epitomizing the year's progress in technique and manufacture, together with a comprehensive selection of useful formulae and other miscellaneous information.

MEETINGS OF THE SOCIETY.

ORDINARY MEETINGS

Wednesday evenings, at 8 o'clock (unless otherwise announced).

MARCH 5.—PROFESSOR ARTHUR R. LING, M.Sc., F.I.C., School of Malting and Brewing, University of Birmingham, "Brewing as a Branch of Science." SIR WILLIAM WATERS BUTLER, Bt., F.C.S., Past President of the Institute of Brewing, will preside.

MARCH 12.—PROFESSOR G. ELLIOTT SMITH, M.D., F.R.S., "The Human Brain." SIR OLIVER LODGE, LL.D., D.Sc., F.R.S., will preside.

MARCH 19.—MRS. ARUNDELL B. ESDAILE, "The Portrait in later Monumental Sculpture," CHARLES REED PEERS, C.B.E., P.S.A., F.B.A., will preside.

MARCH 26.—HOWARD ROBERTSON, F.R.I.B.A., Principal of the Architectural Association Schools, "Architecture of To-day and To-morrow." CHARLES MARRIOTT, Hon. A.R.I.B.A., will preside.

APRIL 2.—NATHANIEL LLOYD, O.B.E., F.S.A., "Building Craftsmanship."

APRIL 9.—PROFESSOR F. A. E. CREW, M.D., D.Sc., Ph.D., Director, Animal Breeding Research Department, University of Edinburgh, "Genetical Methods of Live Stock Improvement." SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., Director, John Innes' Horticultural Institution, will preside.

APRIL 30.—G. K. CHESTERTON.

MAY 7.—S. K. RATCLIFFE, "National Parks."

MAY 14.—H. GRANVILLE-BARKER, "A National Theatre."

MAY 28.—HARRY BARNARD, "The Father of English Pottery: Josiah Wedgwood—Potter, Inventor, and Man of Science." FRANK H. WEDGWOOD will preside.

INDIAN SECTION

Friday afternoons at 4.30 o'clock (unless otherwise announced).

MARCH 4 (Tuesday).—T. M. AINSCOUGH, C.B.E., H.M. Senior Trade Commissioner in India and Ceylon, "British Trade with India." GEORGE MASTERMAN

Gillett, M P, Parliamentary Secretary, Department of Overseas Trade, will preside

April 4 —Lieut -Colonel Sir Wolseley Haig, K C I E, C S I, " The Maratha Nation " (Sir George Birdwood Memorial Lecture)

May 9 —David Clouston, C I E, M A, D Sc, The Report of the Royal Commission on Indian Agriculture "

Dominions and Colonies Section

Tuesday afternoons at 4 30 o'clock

March 25 —O J R Howarth, O B E, M A Secretary British Association for the Advancement of Science, The Work of the British Association in Relation to the Empire "

April 29 —

Thomas Gray Memorial Lectures

Monday evenings at 8 o'clock

Commander F G Cooper, R D, R N R Aids to Navigation ' Three Lectures March 24 and 31, April 7

Lecture I —The Mariner s Compass in various forms The Marine Chronometer The Pelorus and Bearing Plates Parallel Rulers and Protractors The Station Pointer The Sextant and Quadrant Dividers The Range Finder

Lecture II —Sounding Machines and Echo Sounding W D Finder Submarine Sound Signals Whistles and Syrens Barometers and Thermometers The Baro-Cyclonometer (Algue s) Telescopes and Binoculars

Lecture III —Clear View Screen Patent Logs Chernikeeff Log Navigation in Fog Leader Cable Janus System of Signalling Bell Buoys, etc Star Charts and Globes Tide Charts Nautical Tables and Books Noctovisor (Professor Baird s)

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK

Monday March 3 Architects Royal Institute of British 9 Conduit Street W 8 p m Mr Frank Pick The Design of Modern Railway Stations in Europe and America

Automobile Engineers Institution of at the Merchant Venturers Technical College Bristol 7 p m Mr H R Ricardo Combustion in Diesel Engines

Chadwick Public Lecture at 11 Chandos Street Cavendish Square W 5 15 p m Mrs Stella Churchill M R C S Infant Welfare Schemes

Chemical Industry Society of at Burlington House W 8 p m (1) Mr A R Martin Water Softening Certain Properties of some Base Exchange Materials (2) Mr H M Langton The Splitting of Castor Oil

Electrical Engineers Institution of Savoy Place W C 7 p m Discussion on Push Button Control opened by Mr J J Fisher

At the University Edmund Street Birmingham 7 p m Lt Col S E Monkhouse and L C Grant The Heating of Buildings Electrically by means of Thermal Storage

Engineers Society of at Burlington House W 6 p m Mr J Pickin Machine Tools

Mechanical Engineers Institution of Storeys Gate S W 7 p m Graduates Section Informal Discussion on Workshop Practice at Home and Abroad

Royal Institution 21 Albemarle Street W 5 p m General Meeting

University of London at King s College Strand W C 4 30 p m Prof E Prestage Portuguese Voyages of Discovery and Empire Building (Lecture II)

5 30 p m Rt Rev A C Headlam Christian Reunion Lecture I—The Gospel and the Creeds

5 30 p m Prof R W Seton Watson Outlines of British Foreign Policy (1815 80) Lecture VII The Reaction from Interference (1859 66)

At University College Gower Street W C 5 30 p m Prof E Gilson L Idee de Dieu dans la Philosophie de Descartes (Lecture II)

Victoria Institute at the Central Hall Westminster, S W 4 30 p m Lt Col T C Skinner The Significance of the Old Testament Scriptures to our Lord Jesus Christ

Tuesday March 4 Automobile Engineers Institution at the Royal Society of Arts Adelphi W C 45 p m Mr H R Ricardo Combustion in Diesel Engines

Electrical Engineers Institution of at the Engineers Club Manchester 7 p m Discussion on Low Temperature Carbonization of Fuel with special reference to its Combination with the Production of Electricity introductory paper by Messrs L H Smythe and L G Weeks

At the College Loughborough 6 45 p m Mr J J Denton Television —Progress and Applications

Photographic Society 35 Russell Square W C 7 p m Mr R N Speaight Some Interesting Personalities in Photography

Royal Institution 21 Albemarle Street W 5 15 p m Sir William Bragg X Ray Determination of the Structure of Cellulose (Lecture IV)

University of London at King s College Strand W C 5 30 p m Prof Sir B Pares Russian History from Peter the Great to 1861 Lecture VII— Triumph and End of Alexander I

At University College Gower Street W C 5 30 p m Prof J de Vries Early Teutonic Civilisation (Lecture I)

Zoological Society Regent s Park, N W 5 30 p m Scientific Business Meeting

WEDNESDAY MARCH 5 Analysts Society of Public Burlington House W 8 p m Annual General Meeting Dr S Judd Lewis (1) The Spectroscopic Investigation of Jams and the like (2) "A Simple Polarimetric Test for Sugars in Jams (3) 'A New Kjeldahl Distillation Apparatus Prof M S Eldin Bey, 'The Detection and Identification of Alkaloids in the Saliva and Salivary Glands

Chemical Engineers Institution of at Burlington House W 8 p m Prof Dr W E Gibbs The Formation and Growth of Crystals

Civil Engineers Institution of Great George Street S W 6 30 p m

Electrical Engineers Institution of at the Cleveland Technical Institute Middlesbrough 7 15 p m Address by Mr B A Robinson Chairman of the North Eastern Centre

Heating and Ventilating Engineers Institution of at the Swedenborg Hall 20 Hart Street, Bloomsbury W C 7 p m Discussion on The Space Required for Central Station Equipment

Literature Royal Society of 2 Bloomsbury Square W C Professorial Lecture 5 15 p m

Sanitary Engineers Institution of at Denison House 296 Vauxhall Bridge Road S W 6 30 p m Alderman C M Reed Civic Sanitary Engineering

University of London at the Imperial College of Science South Kensington S W 5 30 p m Prof C Stormer The Mathematical Theory of the Polar Aurora (Lecture II)

At King s College, Strand W C 5 15 p m Prof H J Laski, 'The Social and Political Ideas of some Representative Thinkers of the Revolutionary Era Lecture VIII – Babeuf and Revolutionary Communism'

5 30 p m Prof P Milyukov The Past and the Present in Russian History

5 30 p m Dr D Subotić Serbian Orthodox Church and the Religious Position in Jugoslavia

At the London School of Economics Houghton Street W C 6 p m Mr F Clement, Office Machinery Lecture VI The Practical Value of Powers Machines

6 p m. Dr G H Miles, 'The Problem of Incentives in Industry (Lecture I)

At University College Gower Street W C 5 p m Dr R J Ludford Cytology in Relation to Physiology and Pathology (Lecture V)

5 30 p m Mr A M Wijk Three Swedish Poets (Lecture I)

THURSDAY, MARCH 6 Aeronautical Society at the ROYAL SOCIETY OF ARTS, Adelphi W C 6 30 p m Major F M Green and Mr H C H Townend Resistance of Air Cooled Engines and the Townend Ring

Auctioneers and Estate Agents Institute 9 Lincoln s Inn Fields W C 7 30 p m Mr W Townend 'The Rating of Licensed Premises

Chemical Society at Burlington House 8 p m (1) Messrs G W Fenton and C K Ingold Influence of Poles and Polar Linkings on the Course pursued by Elimination Reactions Part VII A Generalised Form of the Olefinic Degradation of Sulphones (2) Messrs C K Ingold and J A Jessop Influence of Poles and Polar Linkings on the Course pursued by Elimination Reactions Part VIII The Methylenic and Paraffinic Degradations of Sulphones (3) Messrs C K Ingold and J A Jessop Influence of Poles and Polar Linkings on the Course pursued by Elimination Reactions Part IX Isolation of Substance believed to Contain a Semipolar Double Linking with Participating Carbon

Linnean Society, Burlington House W 5 p m

L C C Geffrye Museum, Kingsland Road E 7 30 p m Mr Percy A Wells 'Plywood its Influence on Modern Furniture Design"

Mechanical Engineers, Institution of at the Royal Technical College Glasgow 7 30 p m Mr Alan E L Chorlton High Speed Oil-Engines with special reference to Railway Traction

At the Merchant Venturers Technical College Bristol 7 p m Mr Francis Hodgkinson Journal Bearing Practice"

At the Engineers' Club, Manchester 7 15 p m Mr A B Winterbottom, 'Tube Protection against Corrosion"

Philological Society at University College, Gower Street, W C 8 p m Mr J P Jopson, Work of the London Board of Comparative Philology

Royal Institution Mr J B S Haldane, Some Problems of Genetics

University of London, at the Imperial College of Science (Botany Lecture Theatre) Prince Consort Road S W 5 30 p m Dr W F Bewley 'Diseases of Glass house Plants (Lecture I)

At King s College Strand W C 5 30 p m Monsieur G Lafourcade Baudelaire ses Origines Littéraires son Influence (Lecture III)

5 30 p m Mr H W Steed 'Masaryk and Central Europe Lecture III The Philosopher in Action"

At the London School of Economics, Houghton Street W C 5 p m Monsieur P Vacher, "The Civil Service in France

At University College Gower Street, W C 5 15 p m Prof J E G de Montmorency 'Momentous Law Suits and Trials in Various Countries from Classical to Modern Times (Lecture VI)

5 15 p m Prof O Meyerhof Chemistry of Muscle in Relation to Problems of Cellular Physiology Lecture I)

5 30 p m Maj Gen Sir G Aston, British Sea Diplomacy Old and New (Lecture I)

5 30 p m Prof W R Chambers Early Tudor Biographers (Lecture II)

FRIDAY MARCH 7 Chemical Industry Society of (Chemical Engineering Group) at 39 Elmbank Crescent Glasgow 7 30 p m Messrs J S F Gard and R F Robinson The Insulation of Heated and Cooled Surfaces"

Electrical Engineers Institution of Savoy Place, W C 7 p m Messrs A L Moore and W T Slater, An Investigation of the Frequency Variations in Induction Watt hour Meters

Geologists Association at University College Gower Street W C 7 30 p m (1) Dr A E Trueman, The Lower Lias (Bucklandi Zone) of Nash Point, Glamorgan (2) Mr A A Fitch 'The Geology of Etchingham and Robertsbridge Sussex" (3) Mr G S Sweeting The Geological Structure of the Ashburnham Battle and Crowhurst Districts, Sussex, with Notes on the Wealden Iron Ore '

Junior Institution of Engineers 39 Victoria Street, S W 7 30 p m Lt Col G J Hartley Chile and Engineering in Chile

Mechanical Engineers Institution of Storey's Gate, S W 6 p m Mr L W Schuster The Strength and Design of Fusion Welds for Unfired Pressure Vessels

Metals Institute of at 83 Pall Mall S W 7 30 p m Mr C A Coad Pryor The Manufacture of Glass and some of its more interesting Properties"

North East Coast Institution of Engineers and Shipbuilders at Bolbec Hall Newcastle upon-Tyne 7 15 p m Informal Meeting Discussion on 'The Effect of the use of Electricity in Workshops on Efficiency and Costs

Royal Institution 21 Albemarle Street W 9 p m Mr C Tate Regan Angler Fishes

University of London at the Imperial College of Science, South Kensington S W 5 30 p m Prof C Stormer, The Mathematical Theory of the Polar Aurora" Lecture III)

At King s College Strand W C 5 30 p m Prince D S Mirsky Russian Literary Criticism Lecture VII The Formalists (1919 1930)

King s College (at 40 Torrington Square, W C) 5 30 p m Dr O Odložilík 'Outlines of Czecho Slovak History II Lecture II The Decline of Bohemian Independence

At the London School of Economics Houghton Street W C 5 p m Mr R G Hawtrey, "The Relation of International Trade to Wages" (Lecture III)

At University College Gower Street, W C 5 p m Mr G P Wells Comparative Physiology" Lecture VIII)

5 15 p m Prof O Meyerhof, Chemistry of Muscle in Relation to Problems of Cellular Physiology" (Lecture II)

5 30 p m Prof J de Vries Early Teutonic Civilisation' (Lecture II)

SATURDAY MARCH 8 L C C Horniman Museum, Forest Hill, S E 3 30 p m Prof J R Ainsworth Davis, 'Casting Life in New Moulds"

Royal Institution, 21 Albemarle Street, W 3 p m. Sir E Rutherford, "Atomic Nuclei and their Structure"

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4033 *FRIDAY, MARCH 7th, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> "*Fortunately, people are artists who know it not—bootmakers (the few left), gardeners and basket-makers and all players of games. We do not allow shoddy in cricket or football, but reserve it for serious things like houses and books, furniture and funerals.*
>
> *If it is necessary that everything must be translated into words, our art critics might occupy quite a useful place if they would be good enough to realise that behind the picture shows of the moment is the vast and important art of the country, the arts of the builder, furniture maker, printer and the rest, which are matters of national well-being*"
>
> W. R. LETHABY.

Advertising.—In our issue of January 31st we quoted a passage from the Scapa Society's records indicating that in 1925 an Act for the protection of towns and villages from unsightly advertisements had been placed on the Statute Book. But long before this the alarm was sounded—" In the year 1893 a meeting was held in the Chapter House of St. Paul's Churchyard. During the proceedings it was announced that a deputation of London business men desired to make a statement. It was assumed that their object was hardly friendly to the intention of the gathering, but, when they appeared, the late Mr. John Cook, head of the firm of Thos. Cook and Son, said on behalf of his friends that they had come to wish us good luck (The Scapa Society). " Save us," he explained, " from the ruinous drain of advertising "

The following from *The Nineteenth Century* of that date is surely worth quoting :—

> " It may appear a somewhat faded truism to insist that the object of business is to provide the community, directly or indirectly, with the necessaries and comforts of life, and that one of the greatest assets of national wealth in our crowded country is the unspoilt beauty, which it costs no fresh labour to create, both in town and

> country. But I have found, by long experience, that the view is new to many and impressive because new. A certain amount of publicity is necessary to promote the exchange of useful commodities. Any expenditure of labour, for this purpose, beyond the limit of efficiency, is sheer waste, and very few intelligent observers would deny that if the volume of display were reduced, the position of each competitor for custom would remain unaffected. If the complaint be that certain firms which have built up a business by lavish advertising and have expended considerable sums on the hire of sites and the erection of the more substantial notices would suffer by prohibition or limitation, there is a conclusive *ad hominem* answer. They would still enjoy whatever benefit accrues from their efforts in the past, while, under a scheme of regulation all round, they would be protected in the future from the competitive efforts of other firms. They will further enjoy a monopoly during the years of grace allowed. This alone would be much more than ' compensation for disturbance ' at the end of the term.
>
> The practice grows and must grow indefinitely in the absence of control, not owing to the exigencies of any individual business, but from the assumed necessity of neutralising the effect of antagonistic puffery. A measure of reasonable restraint would, in fact, relieve industry of a self-imposed burden which is just as grievous as the ' load of crushing taxation.' It is to be remarked that the class of commodities, of which the bulk of the open-air display is intended to promote the sale, forms hardly an appreciable element in production even for the home market. They are simply special brands of things of which the gross consumption is not increased, while a very large percentage are goods of foreign origin which compete with the produce of our own factories."

Also the following extracts from Lord Balfour of Burleigh's speech in introducing the second reading of the Act, to amend the Act of 1907, are particularly interesting. The ineffectiveness of the law is surely demonstrated in Piccadilly and Trafalgar Square – the conditions are far worse than in 1920, when the measure was introduced :

> " The advertiser is ruthless in spoiling the charm of public landscapes and of old country towns and villages, and even in destroying our architectural effects. Other places have obtained by private Acts much more efficient protection than is given in the General Act of 1907. If you stand on the parapet on the north side of Trafalgar Square looking down to Whitehall and Westminster (a prospect which Ruskin thought one of the finest in the country), the eye is met by a flaunting coloured advertisement on a blank wall in the middle distance. Some of the extravagances which seem, in my humble opinion, to require Parliamentary interference are such as these : Moving and flash-light advertisements ; advertisements in fields along railways ; huge motor advertisements at the entrances of towns and villages ; large picture or letter advertisements on blank walls ; and large letters and devices defacing the architectural aspect of houses and streets. Moving and flash-light advertisements are universally condemned by public taste, and much electricity, and therefore much coal, is wasted upon their production. They are designed and placed so as not merely to inform but to force attention, whether you want them or not. They abound in all our crowded thoroughfares at night, and, so to speak, every eye is hit as you go along from place to place. There are also the advertisements of motors, tyres, and oils, in and near villages, which it seems to me are quite unduly offensive, and they must be very expensive to their owners. I have been in communication with an association which tries to regulate these matters, and it has been informed by many important firms that they

> would much prefer not to have to put up these advertisements, but they must do so in order to keep pace with their rivals. Many of them, I am sure, would welcome reasonable regulation. I contend that the public are entitled to be protected from aggravating assaults of this kind. They ought to be able to enjoy walks and drives in the country without having their thoughts diverted to traders' wares, and to have restored to them the architectural beauties of old towns and villages. Local authorities, while prohibiting ' alien ' advertisements, may provide special hoardings for them at suitable places. Clause 4 is important. Considerable difficulty has been experienced in obtaining convictions under the Indecent Advertisements Act, 1889, the actual offender often conducting his operations by night ; and the idea which underlies Clause 5 of the Bill is that the person under whose presumed authority the thing is done is made liable."

It is interesting to note that a vice-president of this Society, Lord Askwith, introduced the Bill in 1925 in an admirable speech, which we should like to quote if space allowed. The efforts made by him and other distinguished people must at last save the countryside from being at the mercy of the advertiser. Acts of Parliament have their uses, it would seem, but it is only the force of educated public opinion which in the end is effective.

" My Lords," (said the Lord Chancellor, Viscount Birkenhead, in 1922), " personally I regard this Bill, as I have previously said, as a most futile and unnecessary one, that imposes on local authorities jurisdictions they do not seek, which they have never asked for, and which they will undoubtedly, judging by the experience of the last few years, fail to use when they have obtained it." The Lord Chancellor was prophetic as regards the authorities possibly his own attitude has changed.

The Bill to amend the law with respect to the regulation of advertisements came up for second reading on Friday. We quote Clause 1 :-

> The powers of a local authority under section two of the Advertisements Regulation Act, 1907 (in this Act referred to as " the principal Act "), as amended by the Advertisements Regulation Act, 1925, shall include power to make byelaws for regulating, restricting, or preventing within their district or any part thereof the exhibition of advertisements so as to disfigure or injuriously affect the appearance or amenities of such district or part thereof.

We also quote from Mr. Hilton Young's Rural Amenities Bill. Clause 14 deals with the question of advertisements as follows : -

> Proceedings to restrain the continued exhibition of any advertisement or advertisement hoarding prejudicial to rural amenities may be taken in the county court by the council of the county in which the advertisement or advertisement hoarding has been erected, or by the authority responsible for any town planning scheme which prohibits any such advertisement or advertisement hoarding, and the court may order the removal of the same within such time as the court may prescribe.

Italian Art.—Mr. W. J. Constable gave an exceedingly interesting and comprehensive lecture on Italian Art last Wednesday, illustrated with excellent slides, showing the growth and development of Italian art from the earliest times and the influence of the different schools. The chair was taken by Lady (Austen) Chamberlain, who was chiefly instrumental in getting the Burlington House exhibition together, so it was a particularly memorable occasion. There was a large and very appreciative audience.

This generation can never again see collected together so unique a collection of supreme works of Art. Why, therefore, this difficulty in giving a larger number of people an opportunity of seeing these pictures many times? The exhibition must have so enormous an educative value that the time should be extended much longer and the rooms thrown open in the evenings for lectures. All our Galleries would gain by this and the whole standard of Art in England be raised thereby. The opportunity is great and we do feel that Lady Chamberlain has done a real service to the education of the English public in collecting this noble exhibition of the quintessence of the Art of a great people. Contemporary artists should make a little sacrifice if need be. Their annual exhibition might be held elsewhere for once. The prestige of the Royal Academy would gain enormously by such magnanimity.

West Wycombe.—The Society held a meeting here on Saturday, the 22nd. Among those present were the Hon. Mrs. Graham Murray, Miss Alexander, Mr. H. Avray Tipping, Mr. A. C. Bossom, Mr. Raymond Unwin, Mr. Fred Skull, the Rev. H. Pickles and others. A thorough inspection of all the Inns and cottages was made and also of the little Queen Anne House now in process of restoration for the purpose of a Guest House.

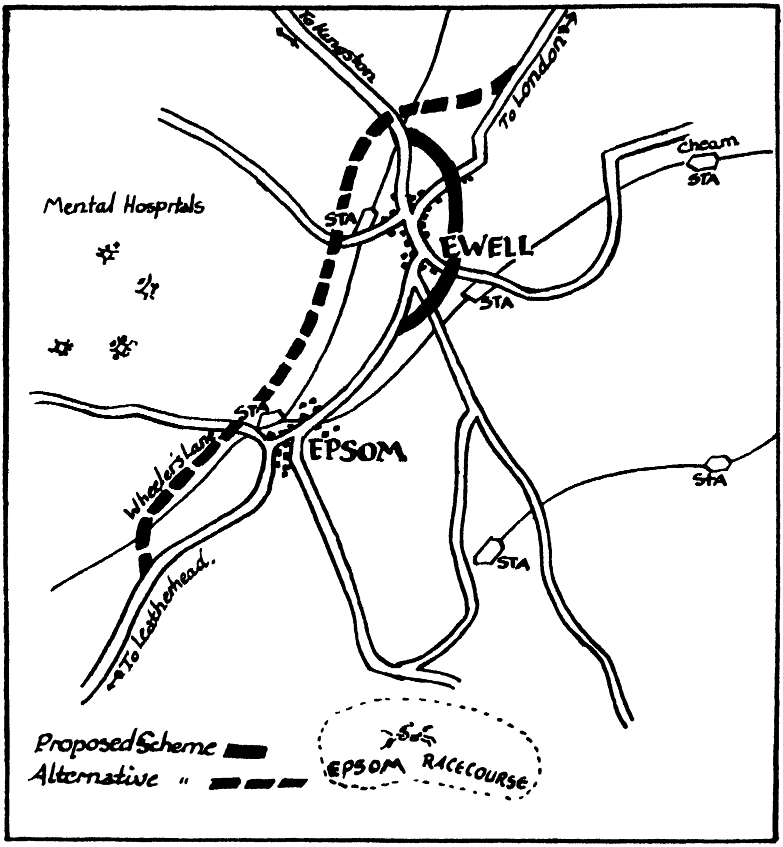
Lady Binning, who is taking such a keen interest in the furnishing and equipment of the Guest House, was unfortunately not able to be present, but she is actively engaged with her agent, Mr. Burrow Hill (also a member of the Society), in this particular piece of work. In about three weeks time it is hoped to have the house ready for furnishing with fine examples of the best models of Wycombe furniture. There will be an office here where information as to all the activities of the Society can be obtained.

The committee came by road, and they were disturbed at the condition of this between High Wycombe and West Wycombe. They feel that the work they are trying to do in West Wycombe will be wasted if it does not re-act on the amenities of the once beautiful country between London and this village. They hope the chairman of the Urban District Council at High Wycombe will not wait for Acts of Parliament to remove all unsightly hoardings and notices, at least, between High Wycombe and West Wycombe. They would also appeal to the Council at High Wycombe to assist the Society by taking immediate steps to put in hand the drainage of West Wycombe, now long overdue, the absence of which is retarding real progress in the village. Mr. Thomas of the Treasury has done his best to urge that the work should be done at once—at least it would provide immediate work for a few unemployed.

Speaking at the annual dinner of the West Wycombe Furniture Manufacturers' Federation, at the Town Hall, High Wycombe, on the same evening, Mr. Clough Williams Ellis said :—"Of course West Wycombe is a great gem; I do think for your own sakes you should give this enterprise of the Royal Society of Arts all the support you can, because it is going to be a great shrine of pilgrimage. People from all over the world will come because there are very few things left in that condition." Mr. Clough Williams Ellis described himself as ex-officio President of the Design and Industries Association. He is a very able successor to the late Sir Lawrence Weaver, who did more than any other man in the last twenty years to revive an intelligent interest in our industrial art. His loss is irreparable at the moment, but Mr. Williams Ellis is doing yeoman service in the cause. It is tragic that Sir Lawrence Weaver did not live to see the taking of the last outpost in the battle of the advertisers. His last public appearance was in the Society's rooms in a debate on this subject.

Ewell By-pass.—The attached plan shows the Surrey County Council's proposed road on the South-east of Ewell, which leaves the Kingston road near the railway bridge, crosses the London road, destroying a nursery with a charming artistic garden with vases and stone pillars, passes on across the ancient packhorse lane from Ewell Old Church to Cuddington, and continues through playing fields and private gardens, crossing the Cheam and Reigate roads, till it reaches the London-Epsom road, into which all the traffic is returned to pass into the bottleneck of Epsom High Street. This by-pass cannot be continued to by-pass Epsom also.

The National Trust which holds land on the route has obtained expert advice and proposes a road to by-pass both Epsom and Ewell on the north-west side, shown on the plan. This road will pass under the railway near the Kingston road bridge; it then crosses the Kingston road and continues through open fields for about a mile till it reaches Pound Lane, Epsom ; skirts the Epsom Recreation Ground and passing through more fields reaches the West Hill road, which it will cross beside the railway bridge, and continues upon the line of Wheeler's Lane till it comes out on Epsom Common to join the Leatherhead and Dorking road, having crossed the railway over a cutting. This road destroys nothing but two small houses, but unless it is made at once will become an impossibility, because plans are already out for building on the fields near Ewell, through which it must pass. The land necessary could be obtained for a merely nominal sum, being "back land," and the expense would be for labour, owing to the length, whereas the expense of the Council's road would lie in heavy compensation to private owners who do not want to sell. It is further argued that the Council by-pass will be of no assistance to general traffic, will make three cross-road and two cross-path junctions, and will increase the congestion in Epsom, whereas the north-west route linking up on the London side with Clapham Common and Tooting, Mitcham, Streatham and



Sutton will solve once for all the general traffic problem of the neighbourhood. For local traffic from Cheam to Epsom a short by-pass is proposed which will enable a dangerous lane (the present local by-pass) to be closed.

A Paradise at Thorpeness.—An interesting article in the *Sunday Express* last week described Mr. Stuart Ogilvie's work at Thorpeness. This is a model village in all respects—but—as the heading of the article has it—" Built out of a hatred for Modernity ! " There is no cinema or promenade and everything is controlled by Mr. Ogilvie himself. This is a splendid work and we are more than grateful to anyone who preserves such a haven of beauty and rest. Mr. Ogilvie is quite definite; he hates everything modern and has been able to carry out his ideas in his own village very successfully. But what is going to happen elsewhere? Life is continually progressing in simplicity and speed and yet in architecture and the arrangement of the countryside we go on in a sort of half-hearted traditionalism, at the same time plastering beautiful cottages with advertisements, and building imitation half-timbered villas! Cannot we evolve a simple and dignified modern style without harking back to the fourteenth century or forward to American reinforced concrete? Mr. Ogilvie's village is an individual experiment and could not be applied to the countryside as a whole, but at least it is controlled by someone who has a feeling for beauty and order. We respect his hatred of all he sees that would probably take the place of his medieval types, but we hope that when the right minds have a chance in England he will realise that we can express our age (and should do so) in our own way. We must have new villages when agriculture lives again and recovers its rightful position of importance in the national life. There will then be a cinema which will be a part of the village standardised forms and not a glaring interruption of the street.

Books. BYRON. The public announcement last week of the purchase of Newstead Abbey for the Nation through the generosity of Sir Julien Cahn, a Fellow of the Society, is followed by a literary event of the greatest interest, the issue by Messrs. Jonathan Cape of André Maurois' "Byron," a very interesting review of which appeared in *The Observer* on March 2nd, by Mr Desmond Macarthy. We glanced at this in the French some while ago, and found it even more interesting than the same author's work on Shelley as a study of one of the most exasperating and unique figures in English literature.

THE RED WAGON. Lady Eleanor Smith has written a most remarkable first novel. We are always clamouring that modern literature is not romantic and beautiful, and complaining of the mass of psycho-analytical propaganda disguised as novels with which the market is flooded. Here we have a really beautiful and colourful gipsy story, full of interest and very vividly written. The author is evidently steeped in Romany lore and has an intense feeling for caravan life. This is not a story written from the outside, but a living thing which makes us feel as we read it that we are on the open road under the stars.

NOTICES

NEXT WEEK

WEDNESDAY, MARCH 12th, at 8 p.m. (Ordinary Meeting.) PROFESSOR G. ELLIOTT SMITH, M.D., F.R.S., "The Human Brain." (Dr. Mann Lecture). SIR OLIVER LODGE, LL.D., D.Sc., F.R.S., will preside.

FOURTEENTH ORDINARY MEETING

Wednesday, February 26th, 1930. Lady (Austen) Chamberlain, G.B.E., in the Chair. A paper on "Italian Art and the Italian Exhibition" was read by Mr. William G. Constable, M.A., F.S.A., Assistant Director National Gallery The paper will be published in the *Journal* at an early date.

CANTOR LECTURE

Monday, March 3rd, 1930. Mr. Alfred B. Searle delivered the third and final lecture of his course on "Recent Improvements in Methods of Brickmaking." On the motion of the Chairman, a vote of thanks was accorded to Mr. Searle for his interesting course. The lectures will be published in the *Journal* during the Summer recess.

INDIAN SECTION

Tuesday, March 4th, 1930. Mr. George Masterman Gillett, M.P., Parliamentary Secretary, Department of Overseas Trade, in the Chair. A paper on "British Trade with India," was read by Mr. T. M. Ainscough, C.B.E., H.M. Senior Trade Commissioner in India and Ceylon. The paper and discussion will be published in the *Journal* at an early date.

ALBERT MEDAL

The Council will proceed to consider the award of the Albert Medal of the Royal Society of Arts for 1930 early in May next, and they therefore invite Fellows of the Society to forward to the Secretary on or before Saturday, March 29th, the names of such men of high distinction as they may think worthy of this honour. The medal was struck to reward "distinguished merit in promoting Arts, Manufactures, and Commerce," and has been awarded as follows in previous years :—

1864, Sir Rowland Hill, K.C.B. F.R.S.
1865, His Imperial Majesty Napoleon III.
1866, Michael Faraday, D.C.L., F.R.S.
1867, Sir W. Fothergill Cooke and Sir Charles Wheatstone, F.R.S.
1868, Sir Joseph Whitworth, LL.D., F.R.S.
1869, Baron Justus von Liebig.
1870, Vicomte Ferdinand de Lesseps, Hon. G.C.S.I.
1871, Sir Henry Cole, K.C.B.
1872, Sir Henry Bessemer, F.R.S.
1873, Michel Eugene Chevreul, For. Memb. R.S.
1874, Sir C. W. Siemens, D.C.L., F.R.S.
1875, Michel Chevalier.
1876, Sir George B. Airy, K.C.B., F.R.S.
1877, Jean Baptiste Dumas, For. Memb. R.S.

1878, Sir Wm. G. Armstrong (afterwards Lord Armstrong), C.B., D.C.L., F.R.S.

1879, Sir William Thomson (afterwards Lord Kelvin), O.M., LL.D., D.C.L., F.R.S.

1880, James Prescott Joule, LL.D., D.C.L., F.R.S.

1881, Professor August Wilhelm Hofmann, M.D., LL.D., F.R.S.

1882, Louis Pasteur.

1883, Sir Joseph Dalton Hooker, K.C.S.I., C.B., M.D., D.C.L., LL.D., F.R.S.

1884, Captain James Buchanan Eads.

1885, Sir Henry Doulton.

1886, Samuel Cunliffe Lister (afterwards Lord Masham).

1887, HER MAJESTY QUEEN VICTORIA

1888, Professor Hermann Louis Helmholtz.

1889, John Percy, LL.D., F.R.S.

1890, Sir William Henry Perkin, F.R.S.

1891, Sir Frederick Abel, Bt., G.C.V.O., K.C.B., D.C.L., D.Sc., F.R.S.

1892, Thomas Alva Edison.

1893, Sir John Bennet Lawes, Bt., F.R.S., and Sir Henry Gilbert, Ph.D., F.R.S.

1894, Sir Joseph (afterwards Lord) Lister, F.R.S.

1895, Sir Isaac Lowthian Bell, Bt., F.R.S.

1896, Professor David Edward Hughes, F.R.S.

1897, George James Symons, F.R.S.

1898, Professor Robert Wilhelm Bunsen, M.D., For. Memb. R.S.

1899, Sir William Crookes, O.M., F.R.S.

1900, Henry Wilde, F.R.S.

1901, HIS MAJESTY KING EDWARD VII.

1902, Professor Alexander Graham Bell.

1903, Sir Charles Augustus Hartley K C.M.G.

1904, Walter Crane.

1905, Lord Rayleigh, O.M., D.C.L., Sc.D., F.R.S.

1906, Sir Joseph Wilson Swan, M.A., D.Sc., F.R.S.

1907, The Earl of Cromer, O.M., G.C.B., G.C.M.G., K.C.S.I., C.I.E.

1908, Sir James Dewar, M.A., D.Sc., LL.D., F.R.S.

1909, Sir Andrew Nobel, K.C.B., D.Sc., D.C.L., F.R.S.

1910, Madame Curie.

1911, The Hon. Sir Charles Algernon Parsons, K.C.B., LL.D., F.R.S.

1912, The Right Hon. Lord Strathcona and Mount Royal, G.C.M.G., G.C.V.O., LL.D., D.C.L., F.R.S.

1913, HIS MAJESTY KING GEORGE V.

1914, Chevalier Guglielmo Marconi, G.C.V.O., LL.D., D.Sc.

1915, Sir Joseph John Thomson, O.M., D.Sc., LL.D., F.R.S.

1916, Professor Elias Metchnikoff.

1917, Orville Wright.

1918, Sir Richard Tetley Glazebrook, C.B., Sc.D., F.R.S.

1919, Sir Oliver Joseph Lodge, D.Sc., LL.D., F.R.S.

1920, Professor Albert Abraham Michelson, For. Memb. R.S.

1921, Professor John Ambrose Fleming, D.Sc., F.R.S.

1922, Sir Dugald Clerk, K.B.E., D.Sc., LL.D., F.R.S.

1923, Major-General Sir David Bruce K.C.B., D.Sc., LL.D., F.R.C.P., F.R.S., and Colonel Sir Ronald Ross, K.C.B., K.C.M.G., D.Sc., LL.D., M.D., F.R.C.S., F.R.S.

1924, H.R.H. THE PRINCE OF WALES, K.G.

1925, Lieut.-Colonel Sir David Prain, C.M.G., C.I.E., M.B., LL.D., F.R.S.

1926, Professor Paul Sabatier, Member of the Institute of France, For. Memb. R.S., Davy Medallist, and Nobel Prizeman.

1927, Sir Aston Webb, G.C.V.O., C.B., P.R.A., 1919-24, P.R.I.B.A., 1902-4, F.S.A., LL.D.

1928, Sir Ernest Rutherford, O.M., LL.D., D.Sc., F.R.S.

1929, Sir J. Alfred Ewing, K.C.B., LL.D., F.R.S.

PROCEEDINGS OF THE SOCIETY

ELEVENTH ORDINARY MEETING

WEDNESDAY, FEBRUARY 5TH, 1930.

SIR EDWARD T. F. CROWE, C.M.G., Comptroller General, Department of Overseas Trade, in the Chair.

THE CHAIRMAN said that Sir William Clare Lees was probably known to most of those present, if not personally, at any rate by reputation, for he was one of the most prominent men in the cotton world, particularly in what is known as the finishing end of that industry. He had been President of the Manchester Chamber of Commerce, and had been a member of the important Committee presided over by Sir Arthur Balfour, which had produced some wonderful volumes dealing with the trade and industry of this country, volumes which everyone interested in our home and export trade ought to read. The lecturer was also a Vice-President of the Association of British Chambers of Commerce, and a Vice-President of the Federation of British Industries.

His lecture dealt with one of the most important parts of the world in relation to the trade of this country. The lecturer had recently accompanied Lord D'Abernon to the Argentine, Brazil and Uruguay as a member of the recent Government mission to South America. Lord D'Abernon was an admirable all-rounder—diplomat, artist, sportsman- and everything he tackled he handled well, and the way he had handled that Mission was, perhaps, one of the finest things he had done; and he was glad to see at that meeting not only Sir William, who had been the member of that Mission dealing with textile problems, but also Mr. Julian Piggott, who had looked after iron and steel matters on the same Mission. Sir Malcolm Robertson, our Ambassador to the Argentine, who was to a great extent responsible for the idea of the Mission, was also present, as was also the author of some valuable reports on Argentine trade, Mr. Chalkley. He hoped, therefore, that there would be an interesting discussion on the lecture. The works of Mr. Chalkley on the Argentine, and of Mr. Irving on Brazil, as well as the forthcoming D'Abernon Report, ought to be read by all students of our trade relations with South America.

The following paper was then read:-

SOME ASPECTS OF TRADE WITH SOUTH AMERICA.

BY SIR WILLIAM CLARE LEES, O.B.E.,

Member of the British Economic Mission to South America

It is important to bear in mind, when reviewing the economic life and development of South America, that the principal countries of that sub-continent have only celebrated the centenary of the attainment of their independence during the present century, and that their commercial history practically dates from within living memory.

The total area of South America is approximately 7¼ million square miles and the population about 80 million. Much of the country presents physical features which render commercial development difficult or even, in some cases, virtually impossible.

Of the countries comprised within the continent of South America, two are of outstanding importance, both territorially and commercially. Brazil, with a total area of about 3¼ million square miles and a population of 39 million, is easily first in point of size, but Argentina is of greater commercial importance although her area (less than 1¼ million square miles) and her population (rather more than 10 million) are substantially less.

Both countries, and Argentina in particular, afford examples of the benefits which the whole world secures through the development of virgin land by emigration and the application of the capital resources of some industrially advanced nations. Both are only at the threshold of industrial development and their prosperity is dependent, in the main, upon agricultural and pastoral or forestal products.

The extent to which the countries of South America share in international trade is indicated by the figures in the table on p. 456.

The figures contained in this table have been taken from the Commerce Year Book, published by the United States Government, and they have been retained in figures of millions of dollars, as the conversion to that monetary unit eliminates variations due to fluctuations in the values of the various currencies.

It will be noted that South America accounts for rather more than 5% of the world import trade and nearly 7% of the world export trade. In both cases Argentina contributes practically one-half of the total. Corresponding figures for the U.S.A. and the United Kingdom are appended for comparison

A further indication of the relative commercial importance of the various South American countries is shown by the table on p. 457, which, in the main, is taken from the same source and which shows the *per capita* value of the total foreign trade of each country in the year 1928 (or 1927 where later figures are not available). The table also contains particulars of the area, population and density of population for each country. Corresponding figures are again appended in respect of the U.S.A. and the United Kingdom.

ARGENTINA

In considering the opportunities for trading with the Argentine Republic the first thought which impresses itself upon the mind of anyone who has seriously studied the question on the spot is the very great advantage which traders in this country enjoy in all the essential and fundamental factors which are pre-requisite in order to obtain and develop a strong footing in any market.

The friendship which exists between the Government of this country and that of the Argentine Republic is rooted in history, and dates back to the time when Argentina became an independent State.

The treaty of commerce which regulates our trade relations is over one hundred

SHARE OF WORLD TRADE†

(Millions of dollars.)

	IMPORTS.						EXPORTS.					
	1911/13 average.		1927.		1928.		1911/13 average.		1927.		1928.	
	Mill. $	% *of World.*	*Mill.* $	% *of World.*	*Mill.* $	% *of World.*	*Mill.* $	% *of World.*	*Mill.* $	% *of World.*	*Mill.* $	% *of World.*
WORLD TOTAL (102 Countries)	20,439	100.0	34,118	100.0	35,041	100.0	19,151	100.0	31,985	100.0	32,994	100.0
Argentine	444	2.2	825	2.4	875	2.5	449	2.3	972	3.0	987	3.0
Bolivia	21	.1	23	.1	22	.1	34	.2	44	.1	41	.1
Brazil..	296	1.5	387	1.1	442	1.3	334	1.7	431	1.3	475	1.4
Chile	123	.6	129	.4	142	.4	136	.7	211	.7	239	.7
Columbia	23	.1	123	.4	123	.3	29	.2	106	.3	114	.4
Ecuador	10	.1	11	—	16	—	14	.1	18	.1	20	.1
Guiana	14	.1	19	.1	*	—	15	.1	22	.1	*	—
Paraguay	6	—	12	—	14	—	5	—	14	—	15	—
Peru	27	.1	72	.2	70	.2	42	.3	117	.4	125	.4
Uruguay	50	.2	83	.2	96	.3	56	.3	98	.3	104	.3
Venezuela	19	.1	69	.2	*	—	26	.1	84	.3	*	—
TOTAL. South America ..	1,033	5.1	1,753	5.1	1,890	5.4	1,140	5.9	2,117	6.6	2,253	6.8
U.S.A.	1,714	8.4	4,185	12.3	4,091	11.7	2,353	12.3	4,865	15.2	5,128	15.5
U.K.	3,558	17.4	5,929	17.4	5,825	16.6	2,904	15.2	4,049	12.7	4,106	12.4

† *U.S.A. Commerce Year Book*, 1929.
* Not available but estimate included in total.

PER CAPITA TRADE (FOREIGN)*

BASED ON LATEST OFFICIAL ESTIMATE OF POPULATION

Country.	*Year.*	*Imports.*	*Exports.*	*Area. Sq. Miles.*	POPULATION. *Year.*	POPULATION. *Official Estimate (000 omitted).*	POPULATION. *Density per sq. mile.*
Argentine ..	1928	$80.6	$91.0	1,153,119	1928	10,850	9.4
Bolivia ..	1928	7.2	13.2	547,000	1928	3,103	5.7
Brazil ..	1928	11.3	12.2	3,286,170	1928	39,104	11.9
Chile ..	1928	32.8	55.1	289,890	1929	4,340	15.0
Columbia ..	1928	15.5	14.3	497,300	1928	7,968	16.0
Ecuador ..	1928	7.9	9.8	110,000	1927	2,000	18.2
Guiana ..	1927	37.0	43.2	174,249	1926/7	500	2.9
Paraguay ..	1928	16.6	18.5	176,000	1928	829	5.7
Peru ..	1928	11.5	20.6	521,513	1922	6,075	11.6
Uruguay ..	1928	53.2	57.5	72,172	1928	1,808	25.1
Venezuela ..	1927	22.3	27.3	393,976	1928	3,116	7.9
TOTAL (S. America)	1928	23.7	28.3	7,221,389	–	79,693	11.0
U.S.A. ..	1928	33.6	42.1	2,973,774	1928	120,013	40.4
U.K. ..	1928	127.7	90.0	94,278	1920	45,625	483.9

years old, and during the whole of that period the feeling of friendship towards this country has continued and intensified until it has permeated the outlook, not merely of the Government, but also of vast numbers of the people themselves. That is a very great asset to this country; it is imperfectly realised by many on this side of the water and insufficiently appreciated by most of us, even those in direct contact with either the official or commercial relationships which are of such paramount importance to both countries. That is the first and most important advantage which we in this country enjoy.

The one which I would place next in importance is the high regard and esteem in which Britishers are held. This is a personal tribute to a long line of able, conscientious and distinguished men who have represented this country not only officially, but also as the controlling heads of the large and important British enterprises which have taken such a leading and decisive part in the phenomenal development of Argentina.

The measure of their success is written not merely in the balance sheets of the companies, whose affairs they have directed: it is written in the good will and

U.S.A. Commerce Year Book, 1929.

perfect confidence which exists between our two nations, the cumulative effect and value of which it is difficult to over-estimate.

This personal tribute would be incomplete if I did not refer to the great services rendered to this country by Sir Malcolm Robertson. Sir Malcolm was not only a very distinguished Ambassador, obtaining and retaining the confidence of those with whom he came in contact, but he was keenly alive to the fact that commercial relationships are the predominant factor in South American policy.

The Economic Mission, which Lord D'Abernon led and of which I had the honour to be a member, would never have crossed the Southern Atlantic but for the vigorous personality of Sir Malcolm Robertson. All who have seen him at work and who have had an opportunity of measuring the great personal influence which he and Lady Robertson enjoyed, must join with me in lamenting the loss we have sustained by the retirement of so distinguished a servant of the State.

These are the intangible assets which we possess, and which it should be our constant care to retain. This can only be done by maintaining the highest possible standard in the personnel, whether it be at the Embassy or in the offices of our great railways and industrial enterprises, reinforced in the latter case by regular visits of those responsible for the direction of affairs at home. Nothing can adequately replace personal contact and personal knowledge.

It may be said that these bonds of friendship to which I have referred are based on sentiment; I am not afraid of that. Sentiment goes a long way, particularly with warm-hearted Latin people, as, indeed, the Argentines are. Friendship counts for much in South America let us see to it that we keep it in repair.

But where sentiment ends, business, and very good business, for both our countries, begins.

There are no two countries in the world more dependent on each other than Argentina and Great Britain. Each is complementary to the other. Each produces what the other lacks, and that brings me to the third great advantage we enjoy; the mutual dependence of one country on the other.

Taking our own position first, about 40% of all the beef consumed in this country comes from the Argentine. For the present, at any rate, there is no alternative source of supply. It is true that in course of time the Dominions might provide an alternative, but they have not done so up to the present.

That is our side of the question; when you examine it from the Argentine point of view their dependence upon us is even more emphatic.

We take 99% of their chilled beef; over 50% of their frozen beef and over 90% of their frozen mutton, in addition to which we are important buyers of maize, oats, linseed, wheat, cotton and wool.

The total exports from Argentina for 1928, the last recorded year, were rather over two hundred millions sterling, of which we took approximately seventy-six million. During the same period our exports to Argentina were only thirty-one million.

In balancing these figures it is necessary to bear in mind the fact that our invested capital in Argentina represents a sum which has been estimated at over five hundred millions sterling. The interest on that sum is remitted in foodstuffs, the production of which has been made possible by the capital invested in the construction of railways, docks, harbours and other forms of development. That interest is one of our invisible exports and goes some way towards balancing the account, but even allowing for that, there is room for a very great increase in our exports to the Argentine market, and it is largely our own fault that we do not obtain that increase.

When discussing the relative amount of trade which we obtain in comparison with other nations, it is a matter for regret that the issue of statistical records by the Argentine Government is so far in arrear.

We were able to discuss the question with the Department and received assurance of attention to the matter.

We can therefore only look at these figures up to 1927.

From our point of view, they do not make very satisfactory reading.

In 1913 we supplied thirty-one per cent. of Argentine imports; in 1924 twenty-three per cent.; in 1927 nineteen per cent.

The following table shows the relative increase or decrease of other nations during the same period:

	1913	1924	1925	1926	1927
United Kingdom .	31.0	23.4	21.9	19.3	19.4
United States	14.7	22.0	23.5	24.7	25.4
Germany	16.9	12.5	11.5	11.4	11.3
Italy	8.3	8.5	9.0	9.0	8.0
France	9.0	6.6	6.8	7.4	6.9
Belgium .. .	5.2	5.3	4.6	4.8	4.6

Although these figures indicate that we are obtaining a diminishing proportion of the whole, that does not mean that we are doing less trade when expressed in money values. Actually we are doing more trade, but we are not keeping pace with the increased purchasing power of the country.

In 1913 we exported approximately twenty-three millions sterling; in 1927 this had risen to twenty-seven million, and in 1928 to thirty-two million. Looked at by themselves those are not unsatisfactory figures, but during the same period the United States increased from eleven millions sterling in 1913 to thirty-seven million in 1928, and that tendency has not exhausted itself, for during the first six months of 1929 the imports from the United States show a further increase, whilst those from this country are somewhat less in value than they were in the preceding year.

Those figures naturally lead us to an examination of the causes which have contributed to this loss of our relative position. Why should we advance so slowly whilst America forges ahead at such a pace?

One thing is certain: it is not due to any change of sentiment in regard to British producers or British goods.

Nor is it due to any considerable extent to American goods supplanting British goods.

The chief reason is that whilst we have retained our lead in the old lines of trade, others, notably America, have produced and marketed all those newer types of things which are so marked a feature of present-day life in a highly-civilised country.

Motor cars, radio apparatus, gramophones, cinematograph goods, sewing machines, to mention only a few. These are the kind of things for which such a growing and insistent demand has developed, and we have not met it. The result has been that this great increase in the purchasing power of the country has flowed outwards in other directions, increasing the trade of those countries which could supply the right thing at the right price.

There are also several other influences, each of which has tended to divert trade from this country.

Finance has played some part in recent years in this diversion, and has operated in two directions.

In the first place, ever since the imposition of the 2% tax on Foreign Bonds issued on the London market, the tendency has been for the Argentine Government to arrange its loans in New York instead of London. I am pleased to note that a considerable loan was negotiated privately recently in the city, but apart from that, since the imposition of the tax, America has provided the Argentine with some seventy to eighty millions of pounds, the investment of which must have created a current of trade from the United States to the Argentine.

Another factor adverse to this country has been the tendency of large corporations, both American and to some extent European, to buy up British-owned companies. This has been especially pronounced in electricity and telephone companies. The immediate transaction may be, and generally is, satisfactory to the present shareholders, but the ultimate effect on British trade is disastrous.

It is gratifying to know that steps have been taken by the leading British Railways and others to ensure the permanence of British control of those companies for the future.

Another factor which is operating adversely to our trade is the question of Standards.

Standardisation has a profound influence on the direction of trade in any market, and in no market of the world is this more true than in South America. In the early days of industrial development this country enjoyed the very great advantage of being in most cases the originator of industrial equipment, and in all the overseas markets this led to the adoption, at that time, of British standards.

The fact that British capital was mainly the means of providing all the equipment of new and rapidly developing countries in Latin America led to large and continuous exports of materials for the construction of railways and utility enterprises of all descriptions.

The magnitude of this important means of stimulating our export trade over a long period of years must be admitted when the figures are examined.

British capital invested in Argentina is estimated to have aggregated a sum of from five hundred to six hundred millions sterling.

Not only did the investment of this colossal sum cause a constant flow of constructional material of all descriptions to pour into the Argentine, but it established British standards, and in so doing established the basis for a recurring trade for renewals and replacements.

Slowly but surely a change has been taking place, stimulated in the first place by the incidence of the War, when material was difficult to obtain from this country, and later owing to the influence of finance.

A further cause of loss of trade is due to the fact that Argentina is essentially a price market. Price is everything: durability in a country changing and developing at such an astonishing rate is naturally a secondary consideration.

The result has been a steady drift towards standards deemed by the buyers to be good enough for the time being, though admittedly not so good as the high standards which we in this country seek to maintain.

As a consequence, we find that Belgian standards are accepted by buyers and users of steel.

American standards are becoming prevalent in electrical equipment.

In textiles, the taste and demand in woollen yarns is for the French and Continental method of spinning, which produces a more " springy " and drier feel than our English method, with the result that the Continental standard is very generally, though not exclusively, preferred.

Many other examples might be given. The cumulative results of these divergences from normal British standards is a diminution of our shares in Argentina's total imports.

This does not mean that we are doing less trade than we did in 1913 ; we are doing a good deal more, but it does mean that we have not increased our trade in ratio with the growth of the market.

The question of standards is one of great difficulty for our manufacturers. When tenders are called for, if the standard is different from that which their plant is laid out to produce, they are placed at an immediate disadvantage.

It is very largely this fundamental difficulty which leads to many indiscriminate and undeserved criticisms levelled against British manufacturers to the effect that they will not give the buyer what he wants.

On the other hand, let us be under no illusions. South America, in general, and Argentina, in particular, has adopted these standards, and they are not going to change them to please us.

They will give us the business if and when we can give them the same thing at the same price.

Can we afford to stand by and witness the loss of a market which in all human probability will increase during the next fifty years more rapidly than any other part of the more highly civilised world ? Every year that passes, every enterprise that is established equipped with plant based on non-British standards, makes it more difficult for us to regain ground which not so long ago was almost exclusively our own.

I regard this question of standards as of paramount importance and one deserving the most earnest consideration of all trade associations.

I suggest to those responsible for the direction of those trades which are affected by this trend of circumstances arising from national taste and habit, that in considering this problem they are in the presence of fundamental factors which are to-day moulding and shaping the course of trade, the volume of business and the extent of employment in which this country will participate to a greater or less degree according to the methods adopted to meet and overcome a position of undoubted, but not insuperable, difficulty.

One other thought in this connection. As the control and direction of trade becomes more international in its operations, there is a growing tendency to mark out geographical areas and allot quotas of trade to this or that industry or producing country.

I am not criticising that method of doing business. All I wish to say to those concerned is this : when entering into agreements of that kind, be sure that we in this country have our fair share, not merely of the present volume of trade, but also a full participation in the natural growth which may be expected with assurance, amounting almost to a certainty, in a rapidly developing country.

The importance of all these questions must be prominently in the minds of those who have been actively engaged in the negotiation of the Trade Agreement concluded between His Majesty's Government and that of Argentina.

That Agreement provides for upwards of nine million pounds' worth of material being produced and exported from this country which would not otherwise have been produced here.

It is probable that some of it will call for the adoption of new standards and new methods of production.

It is of vital importance that the arrangement shall go through smoothly and satisfactorily to the buying departments of the Argentine Government.

The Agreement is based upon the recognition by both countries of their mutual dependence the one on the other.

Reciprocity in trade is the natural outcome of the economic facts which govern the position.

It may well be that this Agreement is the beginning of a new and enlightened economic policy which, when more widely adopted and wisely pursued, will prove a valuable method of increasing the trade of this country.

As the largest buyer of food stuffs and raw materials in the world, we are entitled to ask those from whom we buy to buy from us.

The potentialities of the buying power of this country have never been adequately exploited.

We have taught the world to take our free and open market for granted. Argentina does not so view it. She recognises the immense importance of this outlet for her products, and in the Trade Agreement which the representative of her Government signed on November 8th, 1929, has given public adherence to the doctrine Buy from those who buy from us.

This is a much more fruitful method of increasing the trade of this country than any I can conceive of. It places no obstacles in the way of trade, creates no barriers and closes no doors.

On the other hand, it ensures a square deal for this country.

By the generous scale of our National Insurance schemes, pensions, and other forms of relief, we have diverted vast sums from the investing classes which has increased the spending power of our working classes. Owing to the fact that we have to rely on overseas markets for our food supplies, a very large proportion of that increased spending power has been, and will continue to be, spent on foreign food stuffs.

This increased spending power, created largely at the expense of the British taxpayer, has been of immense importance to overseas producing countries.

If, coupled with this increased expenditure on food and other materials, we had coupled Trade Agreements based on the principle of reciprocity, the increased volume of trade which would have resulted therefrom would have gone far to reduce our numbers of unemployed to reasonable dimensions, and pay for the social services which have created the increased demand.

Is it too much to hope that as a result of the Economic Mission, so ably led by Lord D'Abernon, the fiscal controversies of this country may be lifted on to a common platform, with reciprocity as its foundation and " Buy from those who buy from you " as its motto.

Before passing on to a consideration of other markets, there is one other subject which is of great and fundamental importance, not only to Argentina, but also to all other countries dependent on agricultural products for their export trade.

We received very few complaints in the countries we visited, but in Argentina, and also in Uruguay the low price which they are obtaining for their products was frequently mentioned.

As their principal customer, we naturally were made the recipient of this complaint.

The problem is not a national problem, it is a world problem, but in order to examine and measure this very real hardship from which all who to-day are exchanging agricultural produce for manufactured goods are suffering, I have extracted from the annual returns of Foreign Trade, published by the Argentine Government, a table which sets out the index numbers showing quantities and prices of the total imports and exports of Argentina.

INDEX NUMBERS OF IMPORT AND EXPORT TRADE

Year.	*Quantities.*		*Prices.*		*" Real " Values.*	
	Imports.	*Exports.*	*Imports.*	*Exports.*	*Imports.*	*Exports.*
1910	100.0	100.0	100.0	100.0	100.0	100.0
1911	104.3	89.2	102.6	98.6	106.7	88.0
1912	109.4	131.8	108.3	97.8	117.7	128.9
1913	119.8	136.1	109.9	98.0	130.8	133.4
1914	77.3	102.2	110.8	101.3	85.1	103.6
1915 . ..	64.5	128.5	126.8	116.4	80.6	149.6
1916	61.8	112.0	160.6	131.4	96.6	147.3
1917	52.4	80.3	198.3	176.1	100.2	141.4
1918	47.1	117.4	294.0	175.5	131.9	206.0
1919	65.3	137.1	277.6	193.3	172.8	265.0
1920	85.6	133.2	302.8	201.5	246.5	268.3
1921	79.8	123.3	259.1	139.8	197.6	172.5
1922	88.4	151.7	213.9	114.5	181.8	173.7
1923	109.0	159.0	218.8	124.7	228.9	198.2
1924	108.1	195.5	210.2	132.9	218.4	260.0
1925	121.0	151.9	198.3	146.9	231.1	223.1
1926	126.1	180.0	177.7	113.1	216.8	203.6
1927	133.7	227.7	174.4	113.9	225.8	259.4

The figures contained in this table, although derived from an official source, must be accepted with the reservation that they are not to be taken to be an exact representation of relative quantities or price levels, owing to the fact that the values upon which they are based are those applied in the first place for the purpose of customs valuation. The original values have, however, been corrected by the Government Statistical Office and the resulting " real " values are sufficiently accurate to effectively illustrate the point to which I wish to draw your attention.

It will be observed that in all cases the indices are related to the base of the year 1910, and that in the last few years the indices of " real " values of imports and exports have been fairly close together (by " real " values is meant the approximate total amount received for exports and paid for imports), but if you will examine the indices of quantities and prices you will appreciate that the composition of the total value is very different in the two cases. In the year 1927 imports were 125% greater in value than in 1910, and this increase was attributable to an increase in the volume of imports of 33% and to an increased price of 74%. In the same year the value of the exports was 159% greater than in 1910, but this increase was made up of 127% increase in volume and of only 13% in price. To put the matter quite simply, Argentina had to sell 227 units of her produce at a price of 113 to obtain an income of 259 units, and in expending 225 units of that income she had to pay a price of 174, her consumption of imported goods being, in consequence, only 133 units of volume.

Fortunately, with both Argentina and Uruguay, we are able to mitigate the effect of this great disparity by taking a greatly increased volume, and at the other end of the scale, improved methods of cultivation, the extended application of agricultural machinery, the improvement of breed by the constant influx of pedigree stock, have all contributed to lower, not only the cost, but also the effort of production.

Nevertheless, these figures give some indication of the pressure which the post-war level of prices in industrial countries is exerting upon agricultural communities, and, moreover, they throw a searching light upon our post-war unemployment problem when it is realised that the human effort represented by 227 units of agricultural produce must be exchanged for that represented by 113 units of manufactured goods instead of 100 for 100. The rates are, of course, approximate, but the moral remains, that low prices and high volume of production, which are the real synonyms for a higher standard of living, are most readily obtained where human influences are less in sole control.

URUGUAY

The city of Montevideo occupies a commanding position at the mouth of the River Plata, comparable to that of Gibraltar at the gates of the Mediterranean.

Its people, and, indeed, the entire population of Uruguay, are intensely in earnest in seeking to increase and extend the trade and commerce of the country.

With a population of under two millions and an area half as large again as that of England, it seems obvious that an increase in the prosperity of the country must be dependent upon an increase in the exports of pastoral products.

That being so, an open door should be maintained to receive manufactured products as a means of payment.

There is a good deal of confused thinking on this subject in Uruguay, the view being held in many quarters that an exactly contrary policy should be adopted. High tariffs, designed to limit the importation of manufactured goods, are advocated by this school of thought, which ignores the fact that this type of imports is the only possible means of payment for their primary products of meat and wool.

We are easily first in the list of Uruguay's customers, but in spite of this we occupy the second place in exports to that market, the United States taking the first place.

There is a distinct need for a more enterprising and understanding policy in our trading relations and in the conduct of those organisations which have been built up as a result of the investment of British capital.

There is room for closer co-operation in more than one direction.

It should not be difficult, having regard to our extensive purchases of Uruguayan products, to arrange some policy of reciprocal trading which would be of advantage to both countries.

Uruguay needs two things: an outlet for her exports and capital to develop the utility services of the country. We can meet both these needs. On the other hand, we require a market for our manufactures.

The interests of the two countries are therefore complementary, and the policy we ought to pursue is one which would develop the latent possibilities of the position to the utmost extent in the interests of both countries.

BRAZIL

The commercial relations between Brazil and this country are very different from those which we have already examined as at present existing in the Argentine.

Brazil complains, not without reason, that we are poor customers, taking less than four million pounds worth from her as compared with forty-four million which the United States import.

This is largely due to the fact that we are not large coffee drinkers, whilst the United States consume large quantities.

In 1928, the United States took over seven million bags of coffee from Brazil; during the same period we took less than ten thousand.

Coffee represents approximately seventy per cent. of Brazil's total exports, and it is estimated that an equal proportion of the total revenue of the country is derived from the same source.

Small wonder then that Brazil thinks largely in terms of coffee.

On the other hand, no country so vast in area, so blessed by nature with climatic and natural advantages can be satisfied to rely permanently on any one commodity for her internal revenue and overseas trade.

The Coffee Defence Scheme is designed to control the price and limit the movement of coffee in such a way that the markets of the world shall be supplied with all they require, but that surplus supplies should be held and financed rather than that they should be forced on an unwilling market. Up to a point the scheme has worked well and has undoubtedly been very helpful to the growers of coffee, but whilst it provides for a control of price and movement, it does nothing to limit the amount grown and harvested. On the contrary, the satisfactory prices obtained under the Scheme have tended to stimulate production. Very large stocks have accumulated in consequence, which in turn have called for loans of considerable magnitude in order to finance the growers.

These loans have been raised mainly in the London market, so that we have played an important part in helping Brazilian trade through these financial operations, though our imports from Brazil have been on so small a scale.

The weight of stock is, however, telling on the market. Considerable reductions in prices have taken place. It remains to be seen whether this inducement will enable Brazil to dispose of a sufficient volume of coffee to relieve what is undoubtedly a difficult situation.

Meanwhile an undue proportion of the nation's internal capital and external credit is being absorbed in the effort to support the principal industry of the country.

These difficulties, serious as they are for the moment, can only be transitory in a country of such vast potentialities, containing, as it does, an area twice the size of India; much of it lying within a temperate zone.

A nation which has created in the short space of forty odd years an industrial equipment with a capital of one hundred and thirty-four millions of pounds sterling, employing three hundred and sixty-five thousand workpeople, is not going to stand still and rely on one agricultural crop, however profitable that crop may be, for over seventy per cent. of its external trade and internal revenue.

The result of the difficulties of the moment will give added stimulus to a movement already well advanced, tending to greater diversification of production and crops.

It is in this direction that Great Britain can become a valued customer of ever-increasing importance.

The growth of oranges, bananas and cotton, the production of cattle for export in the form of chilled beef, are a few examples of the commodities in which development is taking place and will continue to take place.

The English market is the obvious outlet for these new supplies. Our doors stand open, no tariffs bar the way. We shall therefore be, in all probability, one of Brazil's most important customers in the not-distant future.

It is greatly to be desired that this should be so. We cannot expect to exert any great influence on the economic policy of Brazil so long as our imports from her are three millions a year, whilst she takes from us nineteen millions.

The following tables indicate the relative position of the seven leading countries trading with Brazil.

The first table shows imports into Brazil and compares 1913 with 1928, the percentage of increase or decrease being indicated in the last column.

From these figures it will be seen that although we have increased our trade in money value by over eighteen per cent., the United States has increased one hundred and twenty-eight per cent. in the same period. Argentina has more than doubled her trade; Italy has increased twenty-two per cent.; Holland four per cent.; Germany and France showing small reductions.

BRAZILIAN IMPORTS BY LEADING COUNTRIES

Countries of Consignments.	*Value in £.* 1913.	*Value in £.* 1928.	*Increase or Decrease in* 1928 *upon* 1913
1. United States	10,553,433	24,089,730	128.3%
2. Great Britain	16,436,421	19,518,764	18.7%
3. Germany	11,737,398	11,304,292	- 3.7%
4. Argentina	4,908,706	10,461,420	100.3%
5. France	6,571,965	5,755,754	12.4%
6. Belgium	3,431,995	3,572,774	+ 4.1%
7. Italy	2,544,407	3,367,066	+ 22.3%

In a statement issued by the Minister of Finance (one of the most admirable compilations I have ever seen), the position is summed up in these words :

> " Notwithstanding the fact that Great Britain increased the value of her exports to Brazil from £16,436,421 to £19,518,764, her displacement to second place is attributable to her inability to supply us during the war years. With the passing of time, however, her industries are gradually returning to normal, and there is every likelihood of Great Britain occupying first place again very shortly. In support of this contention, it is sufficient to draw attention to the fact that our purchases in the United States, last year, only exceeded those made in Great Britain by £5,000,000."

It is interesting to note that the value of motor cars and their accessories, which for the present, at any rate, we are not able to compete with, amounted to a figure in excess of five million pounds.

The second table is arranged in the same form and shows the destination of Brazilian exports to the seven principal markets.

Great Britain cuts a sorry figure in this picture, largely owing to the fact that whereas we formerly obtained most of our rubber from Brazil, we now draw our main supplies from Malaya.

It is within the power of Brazil to increase greatly her exports to us.

It has been stated on good authority that cotton is grown in Brazil at considerably less cost than in North America.

With suitable seed selection and greater care in grading and sorting, there is no reason why we should not take a million bales a year from Brazil if that quantity could be made available. This one item alone would increase our imports by twenty millions sterling a year. And why not? A nation that can establish and organise an industry like the coffee-growing industry can do anything if there is the will and determination necessary to bring about the desired result.

This is only one of many commodities of which great and rapid increases in the volume and value of exports to this country may be anticipated.

BRAZILIAN EXPORTS BY LEADING COUNTRIES.

Countries of Destination.	*Value in £*		*Increase or Decrease in 1928 upon 1913*
	1913.	1928.	
1. United States	21,103,483	44,278,917	+ 109.8%
2. Germany	9,159,313	10,909,168	+ 19.1%
3. France	7,992,442	8,931,924	+ 11.8%
4. Argentina	3,104,183	5,783,529	+ 86.3%
5. Netherlands	4,784,506	5,611,605	+ 17.3%
6. Italy	836,890	4,834,210	+ 477.6%
7. Great Britain	8,623,309	3,354,236	— 61.1%

Trade with Brazil in many classes of goods is confined to specialities which are not made in the country. In cotton piece goods ninety per cent. of all the goods consumed is provided for by national production. Woollen goods, hosiery and boots are largely produced in their own factories.

The high level of the Tariff has greatly favoured national production, but, in spite of this, there is a considerable trade in specialities; machinery of all descriptions, railway material, and a hundred and one other things which they do not make for themselves.

Up to 1913 we held the first place as the largest exporting nation to Brazil. To-day, we are second to the United States.

The past twelve months has been a period of great difficulty for all business people in Brazil, whether they were dealing in imported goods or were manufacturing for themselves.

Under-consumption, delayed payments, bankruptcies and concordatas all conspired to make the path of trade difficult and dangerous; nor is it surprising that this has been their experience.

I have already referred to the difficulty of financing the heavy stocks of coffee In addition to that there has been a substantial fall in values

Type 4 Santos coffee in January, 1930, is quoted at approximately thirty per cent. less than it was quoted a year ago, and many other commodities have fallen in price to a greater or less degree

One good result, which has already taken place arising from these troubles, is the wise and beneficial revision of the Bankruptcy Laws, which, if properly administered, will undoubtedly make Brazil a safer and better market to trade in.

Present difficulties will pass away. The trend of trade and production in a young and developing country, whose population is increasing rapidly owing to a constant flow of immigrants, must over a long period be in an upward direction. There will be ups and downs. Mistakes have been made, and, no doubt, many more will be made, but considering the fact that Brazil economically is little more than forty years old, the progress already made is remarkable.

Great opportunities for the investment of capital will be continually forthcoming. Care and discrimination are necessary in making those investments, but having said that, may I remind you that British trade and British prestige have been built up in the past by those who combined business instincts with a spirit of adventure.

It is to such as these that the future of Brazil must make an irresistible appeal. The country is vast almost beyond imagination, its population sparse and means of communication insignificant compared to the needs of the country. For generations to come development will go on, the tide of progress and prosperity will doubtless ebb and flow according to circumstances and the quality of government which will vary from time time,'but over a long period of years there can be no doubt that vast changes and developments will take place. Let us see to it that we have the courage and foresight to play our part and obtain our share in that development which will be so greatly to the advantage not only of Brazil, but also to our own people at home.

In this survey of some of the influences which are affecting our trade in the markets to which I have referred, I have purposely refrained from wearying you with figures so far as they could be avoided, but the subject is incomplete without them. For those who wish to look a little more closely into the statistical side of the subject, an appendix will be found at the end of the paper, setting out some of the most striking and significant figures.

If I have been optimistic of the future of South America, I suggest that solid reason for that view will be found in these figures.

If I have shown anxiety as to the extent of our participation in that progress, justification for that also will not be difficult to discover.

But I believe that there is a stirring of interest in South American markets taking place in this country. Let that interest be translated into action; financial action in the provision of funds for extension and development; commercial action in a determination to have a share in the sale of the newer types of commodities of which there is such an insistent demand.

If that be added to the already important trade we are doing, we may then see Great Britain once again first in the order of Exporters to South America.

APPENDIX

ARGENTINE

FOREIGN TRADE.

The following tables show the percentage share of various countries in the import and export trade of Argentina. It will be noted that, so far as regards exports, the 1927 figures are not strictly comparable with earlier years owing to the distribution amongst the countries of destination of "shipments for orders" which, in earlier years, were not allocated. To the extent that these quantities were not allocated, the proportions of trade for certain countries in earlier years are understated.

Percentage of Imports (Value) from :-

	1913. %	1924. %	1925. %	1926. %	1927 %
U.S.A.	14.7	22.0	23.5	24.7	25.4
U.K.	31.0	23.4	21.9	19.3	19.4
Germany	16.0	12.5	11.5	11.4	11.3
Italy	8.3	8.5	9.0	9.0	8.0
France	9.0	6.6	6.8	7.4	6.9
Belgium	5.2	5.3	4.6	4.8	4.6

Percentage of Exports (Value) to :-

	1913. %	1924. %	1925. %	1926. %	* 1927. %
U.S.A.	4.7	7.1	8.3	9.1	8.3
U.K.	24.9	23.2	23.9	25.1	28.3
Germany	12.0	10.0	10.2	10.4	16.5
Italy	4.1	3.9	4.0	4.3	4.4
France	7.8	6.8	7.3	5.8	6.8
Belgium	6.8	7.1	6.4	7.5	9.9

* Prior to 1927 nearly 25% of the exports were entered under the heading of "Shipments for Orders," no country of destination being shown. In 1927 these amounts have been distributed (as far as could be ascertained) amongst the countries of destination and the 1927 figures are not, therefore, strictly comparable with earlier years.

(Commerce Year Book and D.O.T. Reports.)

PRINCIPAL EXPORTS

The following statement contains particulars of the value of the principal exports of Argentine produce The great preponderance of agricultural and pastoral products will be noted

Thousands of Dollars

	1927	of Total	
Total Value	971 980	100 00	
Corn	217 994	22 43	
Wheat	102 786	10 58	
Wheat Flour	11 862	1 22	
Linseed	114 765	11 81	
Oats	17 549	1 81	
Bran and Pollard	7 605	78	
Total Agricultural Products			57 88
Beef frozen	29 804	3 07	
Beef chilled	65 385	6 73	
Mutton frozen	12 271	1 26	
Meat preserved	14 266	1 47	
Tallow and grease	16 250	1 67	
Butter	13 372	1 38	
Sheepskins ..	6 048	62	
Hides	59 713 15,257	7 71	
Wool	73 137	7 52	
Cattle	7 102	73	
Total Pastoral Products			32 16
Quebracho Extract	18 512	1 90	1 90
	893 675		91 94

((Commerce Year Book))

WHEAT

The production of Wheat has been —

Period	Thousands of Bushels
1909/10 1913 14 (average)	147 058
1922 23 1926 27 (average)	209 50
1927/28 . .	239 16
1928/29 .	300 000

The relation of Argentine production and trade in Wheat to total World Crops and World Exports is shown by the following statement

Thousands of Quintals.

Period.	*World Crops.*	*Argentine Crop.*	*% of World Total.*
1909/13 average	1,028,609	40,023	3.89
1927	1,171,507	65,090	5.56
1928 preliminary ..	1,255,223	83,651	6.66

Period.	*World Exports.*	*Argentine Exports.*	*% of World Total.*
1909/13 average	144,754	24,249	16.75
1927	194,101	42,254	21.77
1928 preliminary ..	200,208	* 53,271	26.61

* Unofficial.

(*Institute of Agriculture.*)

MAIZE.

The production of Maize has been :—

Period.	*Thousands of Bushels.*
1909/10-1913/14 average	191,701
1922/23-1926/27 average	256,332
1927/28	305,691
1928/29	280,000

(*Commerce Year Book.*)

The relation of Argentine production and trade in Maize to total World Crops and World Exports is shown by the following statement :—

Thousands of Quintals.

Period.	*World Crops.*	*Argentine Crop.*	*% of World Total.*
1909/10-1913/14 average	1,045,332	48,594	4.66
1927/28	1,105,802	77,650	7.02
1928/29 preliminary ..	1,079,119	58,856	5.45

Period.	*World Exports.*	*Argentine Exports.*	*% of World Total.*
1909/13 average	62,276	29,401	47.21
1927	114,396	83,436	72.94
1928 preliminary ..	89,841	* 64,300	71.57

* Unofficial.

(*Institute of Agriculture.*)

CATTLE AND SHEEP.

The extent of the stock of Cattle and Sheep in South American countries is shown in the following statement :—

Average Number of Cattle and Sheep in the years 1921/25.

	Cattle. 000.	*Sheep.* 000.
Estimated World Total	642,200	617,800
U.S.A.	65,421	37,215
Argentine	37,065	36,209
Brazil	* 34,271	7,933
Uruguay	8,117	14,443
Peru	1,198	11,363
All South America (approx.)	100,365	75,669
Australia and New Zealand	17,182	108,938
Russia	59,287	† 104,191
India	180,741	34,685
U.K.	7,748	21,681
Union of South Africa	9,342	32,483

* Includes buffaloes.

† Includes goats

(*Commerce Year Book.*)

WOOL.

South American countries are an important source of supply for raw wool. The following tables show the production and the exports in relation to World totals.

Million lbs.

Period.	*World Production.*	*Argentine.*	*% of World Total.*	*Uruguay.*	*% of World Total.*
1909/13 average	3,248	359	11.1	157	4.8
1926	3,022	315	10.5	125	4.2
1927	3,383	331	9.8	130	3.8
1928	3,467	342	9.9	135	3.9

Million lbs.

Period.	*World Exports.*	*Argentine.*	*% of World Total.*	*Uruguay.*	*% of World Total.*
1909/13 average	2,155	328	15.2	139	6.5
1926	2,041	318	15.6	119	5.8
1927	2,175	346	15.9	152	7.0

(*Commerce Year Book.*)

BEEF AND BEEF PRODUCTS.

The importance of the Argentine trade in beef and beef products is shown by the following figures :—

Million lbs.

Period.	*World Exports.*	*Argentine Exports.*	*% of World Total.*
1911/13 average	2,161	940	43·5
1925	3,460	1,694	49·0
1926	3,188	1,683	52.8
1927	3,121	1,838	58.9

(*Commerce Year Book.*)

RAILWAYS.

The relative importance of the Railways in the two largest South American countries and a comparison with the corresponding figures for U.S.A. and the U.K. is shown hereunder.

1927.

Country.	*Miles of track.*	*Miles per* 10,000 *inhabitants.*	*Miles per* 1,000 *sq. miles of area.*
Argentine	23,854	22.0	20.7
Brazil	19,603	5.0	6.0
U.S.A.	249,131	20.8	83.8
U.K.	20,400	4.6	229.9

(*Commerce Year Book.*)

BRAZIL

FOREIGN TRADE.

The following statement shows the relative shares of different countries in the import and export trade of Brazil.

Percentage of Imports (Value) from :—

	1913.	1925.	1926.	1927.	1928.
U.S.A.	15·7	24.8	29.3	28.7	26.6
U.K.	24·5	22.2	18.9	21.2	21.5
Germany	17·5	13.8	12.6	10.6	12.5
Argentine	7·4	11.7	9.8	11.9	11.5
Italy	3·8	3·6	3·7	3·5	3·7
France	9.8	5.8	6.4	6.3	6.3

Percentage of Exports (Value) to :—

	1913.	1925.	1926.	1927.	1928.
U.S.A.	32.2	45·1	47.8	46.2	45·4
U.K.	13.2	5·0	3·5	3·4	3·4
Germany	14.0	6.8	8.4	10.4	11.2
Argentine	4·7	5·3	6.3	6.0	5·9
Italy	1·3	6·3	5·4	4.6	5.0
France	12.2	12.7	8.7	9.6	9.2

(*Commerce Year Book.*)

PRINCIPAL EXPORTS

The principal exports of Brazilian produce are shown in the following statement —

Thousands of dollars

	1928	of Total
Total Value	475 242	100 00
Coffee	339 998	71 54
Cacao Beans	17 831	3 75
Herva mate (Brazilian tea)	12 655	2 66
Tobacco leaf	8 338	1 76
Rubber	6 960	1 46
Oilseed and Kernel	8 599	1 81
Cotton	4 356	92
Sugar	2 493	53
Fruits and Nuts	3 248	68
Carnauba wax	3 416	72
Total Agricultural and Forestal Products		85 8
Chilled and frozen beef	9 768	06
Hides	26 457	5 57
Total Pastoral Products		7 6
Manganese	4 434	93 93
	448 572	94 39

(Commerce Year Book)

RUBBER

The share of Brazil in the world trade in rubber is shown in the following statement, extracted from the U S A Commerce Year Book The figures of Brazilian exports differ in some respects from the official figures published by the Brazilian Ministry of Finance and the differences do not appear to be capable of reconciliation by reference to the fact that, in one case they are given in long tons (2 240 lb and in the other in metric tons (2,204 lbs)

Long Tons

Period	*World Exports*	*Brazilian Exports*	*of World Total*
1913	120,123	35,659	29 7
1925	528,485	25,208	4 8
1926	623,265	24,298	3 9
1927	* 612 564	28 782	4 7
1928	* 658,000	21 129	3

* Partly estimated

(Commerce Year Book)

The official publication of the Ministry of Finance gives the following figures of exports of rubber from Brazil in metric tons :—

Period.	*Exports Metric Tons.*	% *of* 1910.	*Equivalent Value in sterling.* 000 £.	% *of* 1910.
1910	38,547	100	24,646	100
1913	36,232	94	10,375	42
1925	23,537	61	5,058	21
1926	23,263	60	3,359	14
1927	26,162	67	2,799	13
1928	18,826	49	1,448	6

(*Ministry of Finance.*)

In pre-war years Brazil provided more than one-third of the world exports of rubber but her trade has been seriously affected by the enormous increase in the production of Eastern Plantations, the output of which has risen from 11,000 long tons in 1910 and 54,000 long tons in 1913 to 568,000 long tons in 1927 and 626,000 long tons (approximately) in 1928. Apart from the increased competition from Plantation rubber, the extent to which Brazilian trade has been affected by the fall in the price of rubber is shown in the above table by a comparison of the index of quantity with the index of value, the volume in 1928 being 49% of that in 1910, but the value only 6%.

COFFEE.

The importance to Brazil of her coffee crop and its overwhelming preponderance in the world trade in coffee are illustrated by the following figures :—

Thousands of quintals.

Year.	*Crop.*
1909/10-1913/14 average	7,952
1926/27	8,510
1927/28	17,000

Thousands of quintals.

Year.	*World Exports.*	*Brazilian Exports.*	% *of World Trade.*
1909/13 average	10,830	7,585	70.0
1925	12,713	8,089	63.6
1926	13,473	8,251	61.2
1927	14,298	9,069	63.4

(*Institute of Agriculture.*)

DISCUSSION

H.E. THE BRAZILIAN AMBASSADOR said the lecturer had given so interesting and accurate a picture, and had so fully covered the subject, that he had very little to add to it. The lecturer had also shown the remedies for various deficiencies in trade between Great Britain and Brazil. He might take as an example the importation of frozen and chilled meat from Brazil to this country, which had recently increased tremendously, and the importation of fruit from Brazil, principally its excellent oranges. During the last few years Great Britain had risen from the position of the sixth to the first largest importer of meat from Brazil. Cotton growing in

Brazil was increasing day by day and its use in this country could be augmented enormously, as Brazil's cultures of this commodity were excellent and its staple and quality comparable with the best qualities in the world.

He thanked the Chairman and the lecturer for the very kind words they had said about his country.

H.E. THE CHILEAN MINISTER said he had come to the meeting without any intention of speaking, and solely with the desire to hear the admirable address given by the lecturer. He would, however, do his best to express in a few words the main views of his own people so far as their trade relations with Great Britain were concerned. His countrymen felt proud to have entered upon their independence about 110 years ago in the closest collaboration with the subjects of Great Britain. Living in a country lying along the sea, backed by the Andes mountains and by the desert, the Chileans had become a nation whose character was marked by a spirit of adventure and enterprise. Most of the early traders with Chile were British captains, and British boats had brought most of the products of Chile to Europe. Most of the machinery and implements used in the nitrate deposits and in agriculture were of British manufacture, and Chilean industry had been largely financed by British capital.

In addition to their commercial relations, he ventured to say that there was a certain analogy of soul, a similarity of spirit, which placed the people of Chile and the people of Britain in touch with each other, and produced a link of sympathy and of mutual confidence which was the best ground on which to base every other relation. This mutual comprehension explained the breadth of Anglo-Chilean relations, and also why Britain had built almost all the naval and merchant vessels for Chile. He had recently attended the launching of a vessel at Glasgow, built for a South American company, which had already launched in Great Britain forty ships of a total tonnage of 87,000 tons. The Pacific Steam Navigation Company had held the leading place among all the firms trading with the West Coast of South America for ninety years. In spite of this, during the last four years British exports to Chile had decreased, [illegible] much, but continuously, while Chilean exports to Great Britain had increased, also not much, but continuously from year to year. He was, of course, speaking of visible imports and exports. Great Britain had her own post-war readjustments to make, and her own difficulties in the way of foreign competition to meet, and consequently could not, for the time being, provide Chile with the ample facilities for obtaining capital which she had been able to offer in the past; but this did not mean that British trade was defeated in Chile: on the contrary, he felt confident that the present position would be altered. During the eleven months of last year the Chilean exports to Great Britain had been, roughly, £11,000,000 sterling, while British exports to Chile were, roughly, £6,500,000 sterling. He hoped that a British Mission would be appointed to go to Chile, as a Mission had already been sent to other parts of South America. If his stay in England resulted in such a Mission he would feel himself to be magnificently recompensed.

He thought that an admirable plan to make his people more acquainted with new British machinery would be to hold a British exhibition in Chile. This plan would undoubtedly result in an increase of British export trade figures, would not involve any very substantial expenditure, and would also increase Chilean exports of copper, nitrate, wool, barley and other commodities to Great Britain. Everyone was naturally impressed most by what he saw with his own eyes, and the prestige of British goods, which was the highest in Chile, would do the rest. Everyone in Chile preferred British machinery; everybody bought British machinery even without asking much about the price, almost without discussing quality. The production of Chilean industries was being standardised and placed under the control of duly organised and responsible bodies. It was only necessary to adopt reciprocally adequate methods to promote exports and imports between the two countries and to develop mutual trade to the greatest possible extent.

THE RT. HON. SIR MALCOLM ROBERTSON, G.C.M.G., K.B.E. (Ambassador Extraordinary and Minister Plenipotentiary at Buenos Ayres), said the Brazilian Ambassador had done the Society a great honour in attending the meeting. Some years ago, he (the speaker) had spent three years in his country, and had had close dealings with his distinguished father; but more recently he had been in the Argentine. The lecturer had been kind enough to throw bouquets at him, and perhaps he might be allowed to pass him a little nosegay in return. The lecture he had given was altogether astonishing. He had spent three weeks in the Argentine, a day or two in Uruguay, and about a fortnight in Brazil, and his lecture showed how complete was his grasp of the situation. This was typical of the man. He (the speaker) boasted of some responsibility for the appointment of the Mission to South America. It was due to a hint or suggestion passed to him by a very close friend of the President of the Republic, and he had immediately passed the suggestion home. The admirable Department over which the Chairman presided had answered immediately, and the Mission in due course was despatched. The reception accorded to that Mission was so remarkable that no member of it would ever forget it. Having been extraordinarily well received, because it was British, it made its own way, by the efforts of Lord D'Abernon, the lecturer, Mr. Piggott and Mr. Howard Williams—all friends of his own.

There was one point he desired to stress in the rather deplorable story of British failure to advance in trade, viz., that the United States were making headway in the increased import trade with the Argentine in new things, such as motor cars, agricultural machinery and so on. The British people were not displaying the energy, the enterprise, the imagination, the foresight they used to display of old. He took off his hat to the American, who had a selling capacity which was almost unique. He might give two examples of their enterprise. He had gone away up the Parana River, staying with the Bovril people, and they had been very kind, and had met him with a fleet of motor cars, nine in number, all American. The following morning there were ten motor cars; an American company, hearing that the British Ambassador was going there, had sent up a car "on spec." and placed it at his disposal. Last year an Argentine friend of his, who represented a big American motor car business, had sold a record number of that make of car. The result was that this year he had been given a four months' trip to the United States free, gratis and for nothing, at the expense of the company. That meant money; but it showed foresight, it was money well expended. That man had returned to the Argentine, and he would never look at anything but an American car, and a car of that make. That stood to reason. All that was needed was for British manufacturers to do things of the same kind. The South American countries were literally longing for the British to go there and show that selling capacity. Above all, we had to give up the infernal gloom and depression which was one of the first things that had struck him most on returning to this country. There was nothing we *could* not do, but there was a lot we *would* not do. If only we again displayed the spirit of our ancient merchant adventurers, we could regain our place in the world. We had been talking such utter nonsense for so many years that we were beginning to deceive ourselves. We had taken in the foreigner, for the simple reason that there were far too many telephones, radios, wireless, and so on, that repeated everything we whispered, and the whole world took us at our own absurd word. A short time ago we did not believe ourselves, but he was beginning to fear greatly that we were beginning to believe the utter and entire nonsense that we talk about ourselves. It was time we got up and got busy, and the part of the world in which to do it, the part of the world before which the future lay, was South America.

MR. J. I. PIGGOTT said the lecturer had very fully dealt with his subject, but he might be allowed to underline two points. The lecturer had explained how the Americans had secured the very large increase in imports into the Argentine, how they were nearly all composed of the newer necessities and luxuries of life, such as motor cars. He had often been asked since his return whether there were not still openings for new ideas, new inventions, and so on. He thought there were two big fields in which British enterprise had a chance. There were practically no roads in the Argentine, because there was no stone to make those roads ; the stone had to be brought from very great distances, and various expedients were being studied on the spot for replacing the macadam road or the concrete road with some road which was easily manufactured and laid in the country. Thousands and thousands of miles of road must be made in the Argentine, and surely that was a field which could usefully be explored by British road-making experts.

The other great field was that of civil aviation. He had been told by a member of the Argentine Government that that was a field to which he was devoting particular attention, and he absolutely agreed with Sir Malcolm Robertson that there was no reason why our aircraft manufacturers and our aerodrome equipment manufacturers, and the hundred and one manufacturers who had built up the aviation industry, should not get out on the spot and get in first. He was glad to say that since he had been back several friends of his who happened to be in that line of business had asked him for advice, and he had passed them all on to Mr. Chalkley.

Apart from these points, the lecturer had covered the whole of the Argentine. He desired to add a word about Brazil. The problem of Brazil was in certain respects different. It was not so much a question of selling goods in Brazil, although of course that was important ; but his friend the Brazilian Ambassador would forgive him if he said that the question of getting paid was sometimes difficult ; but if one could raise the capital he was convinced that any enterprising and intelligent man who went and sat down in Brazil for a period of some months, could find almost at his door opportunities for investing that capital wisely and profitably. There were vast masses of population in Brazil who were a generation behind, and they naturally required all the luxuries and necessities of life which were to be found in the neighbouring Republic ; and he believed that if anyone acquired a going concern in Brazil, or even laid down plant for the manufacture of those luxuries and necessities of life, in a very short time a handsome turnover would be seen. He commended this suggestion to people with capital.

MR. LENNOX LEE (President, Federation of British Industries) said there was no one better qualified than the lecturer (whom he had known for forty years), to act as an ambassador of trade from this country to other countries to report on the state of the trade. It had been said that the lecture was provocative, but his experience was that unless one was provocative one never got anything done in this country. He would like to be provocative to His Excellency the Brazilian Ambassador. In England we used three sorts of cotton ; the American cotton ; the Egyptian cotton and, to a very small extent, the Indian cotton. But there was no reason at all why we should not use the Brazilian cotton if they would only grow it to a greater extent there. They could grow an excellent cotton ; it was a cotton similar to the Peruvian cotton, of which Lancashire spun right up to 100's and 120's. He desired to suggest to the Brazilian Ambassador that if they could give more attention to that, everyone in Lancashire would be delighted.

MR. F. W. GOODENOUGH, C.B.E. (President, Incorporated Sales Managers' Association), thanked the lecturer for his most interesting paper, and the other speakers who had supplemented his admirable lecture. He was delighted to see Sir Malcolm Robertson, because he had been so great an inspiration to all of those who had felt strongly on the question of the need for improved salesmanship.

Sir Malcolm had said that we were suffering from gloom over here. He thought it was rather that we were like a broody hen ; we were just preparing to hatch out our best, and were engaged in thought on the subject. He believed that the manufacturers were giving very serious thought to the problem, and were not merely worrying themselves about the fact that they were " in the soup." For some years past we had got into the habit of waiting for somebody else to get us out of our troubles instead of finding a solution of them ourselves. We had got so much accustomed to the State doing everything for us, or thinking that it could, that we had lost the habit of doing things for ourselves. The great lesson we had to learn was that all the friendship, all the advantages that we had from the friendship of the Argentine and of Brazil, and from our investments in these countries, were no substitute for efficient salesmanship on our own part, and for our own energy and drive. Dependence upon those advantages, and upon trade agreements, would prove a poor substitute for our own enterprise, work and foresight. It had to be remembered that there was no source of wealth in the world but that which came from work, and the only way to cure our unemployment and other troubles was by all of those who work with their brains, as well as those who work with their hands, getting busy and devoting themselves unremittingly to the solution of our difficulties. There were no reservoirs of wealth to be tapped other than those fed from the work of the brains and the brawn of our population, and he believed that we were going to get busy and come out on top. He was not at all a pessimist, although in connection with the work of his Committee (on Education for Salesmanship) he had had to study all the evidence of our shortcomings and misdoings. He felt that the country was really awakening to the needs of the times, and that it was learning, though slowly, a much-needed lesson from America, that we must throw our heart and soul into business if we were going to keep our country to the forefront. South America was undoubtedly an enormous field for us for the future.

A MEMBER OF THE AUDIENCE asked whether it was true that England was going to have a preference of a 50 per cent. tariff on art silk imported from England into the Argentine.

SIR WILLIAM CLARE LEES replied that he had no further news, though Sir Edward Crowe might have.

THE CHAIRMAN said that any further information on that subject would be given in the House of Commons.

MR. R. B. DUNWOODY, C.B.E. (Secretary, Association of British Chambers of Commerce), said the country was much indebted to the gentlemen who had formed the Economic Mission to South America and to the lecturer for his address. He was glad Sir William had referred to the Treaty which we entered into with the

Argentine in 1825, because he believed that that Treaty laid the foundations of our trade with the Argentine, and brought about that great spirit of friendship which still existed between us. It was in connection with that Treaty that Canning had uttered the famous phrase about calling into existence the New World to redress the balance of the old. He felt that in these times we must call into existence new markets to redress our trade balance. At this time we were importing into this country £350 millions worth of goods more than we were exporting, excluding the revenue earned from shipping services and banking and insurance So long as we were in that position, with £350 millions on the wrong side, we should, of course, continue to have unemployment. He had been much interested in the motto which the lecturer had encouraged the Argentine to adopt—buy from those who buy from us. When he heard that motto he had thought of the figures of the trade between this country and the United States. The United States sold to us to-day £240 millions worth of goods ; and we were only able to sell to her some £40 millions worth ; and he suggested that a mission should be sent to the United States to try to induce the United States Government to adopt that motto. If only the United States would buy half as much from us as we buy from them a great deal of our unemployment troubles would be overcome.

Sir William had also referred to the position in Brazil. He himself was particularly interested in the Argentine, as a member of the Committee in London dealing with the British Empire Exhibition to be held there, at which exhibits of all Empire products would be shown. He thought that would do a great deal to help to show in South America the products that Britain could at present produce. With regard to Brazil, he had been interested in what the lecturer had said. America bought so much coffee because she was a coffee drinking country, while the British people were not coffee drinkers, instead they bought tea from India.

Mr. R. à-Ababrelton said the lecture had been a magnificent one. He was an economist, and he was interested in Great Britain, which was suffering terribly because of the excessive taxation and increasing local rating under which it laboured. Owing to this, a great deal of the wealth which could be devoted to those things which the lecturer had been putting forward was not there ; the money was sent away to a large extent to the United States. The taxation of the people of the United States was being greatly reduced. They did not pay anything like the taxation and the rating that the British people paid, and it was because of that to a large extent that our manufacturers were not able to use the wealth they would otherwise possess to capture those markets to which the lecturer had called attention.

Mr. H. L. Symonds agreed with the previous speaker that our trouble in South America was due largely to the fact that the Americans had a lot of money to splash about there just now in making experiments, very often in making losses in business, which money they were really receiving from us in payment of our debts. It was impossible to develop business abroad, as had been proved in years gone by, unless one was prepared to leave a lot of money in the country, but our turn would come.

Mr. R. Dunwoody said he could well remember the very old days when he used to pay 2d. in the £ taxation—in about 1874.

A Member of the Audience asked the lecturer whether, in considering the factors which had hampered British trade in South America, he would include the question of carrying goods from the United Kingdom to South America. He frequently saw it stated that rates of freight were often lower from the Continent, and sometimes from America, and it seemed possible that goods produced on the Continent and in America might be assisted in that way. He wished to know whether this was a fact.

SIR WILLIAM CLARE LEES said it was a fact. Probably Sir Edward Crowe realised better than anyone else in this room the extreme difficulty he (the speaker) had had that evening in giving his lecture, when already in print was the official Report on the Mission. In his lecture that evening he had tried to avoid the whole of the ground covered in that Report. The subject of the question was pretty well covered in the Report.

THE CHAIRMAN pointed out that although he was not in a position yet to state to what countries missions would go, it must be remembered that a short time ago the Lord Privy Seal had said that he hoped that shortly it would be possible to send further Missions abroad, in view of the great success which had been achieved by the D'Abernon Mission.

On the motion of the Chairman, a hearty vote of thanks was accorded to the lecturer.

NOTES ON BOOKS.

COMMERCIAL ART PRACTICE. By C. C. Knights and F. E. Norman. London: Crosby Lockwood. 10s. 6*d*.

Psychology is to many advertisers what prose was to Monsieur Jourdain. The public may be allowed to have a little quiet fun from time to time and investigate the psychology of advertisers, whose own investigations have on the whole given them so poor an opinion of the public.

Nearly everything nowadays is *the best* and *a triumph*; but does the Cockney believe this any more than the Parisian? At any rate, the language of hyperbole is not more irritating than pictures of Julius Caesar landing in Britain which turn out to be advertisements for some tooth paste. Nobody has asked me what I think, but if they did I should lift up my finger and I should say T for Toblerone! I hope that Messrs. Gospo will never try to improve on their superb picture of a line of reversed cats to which is attached the legend: "Cats White, Homes Bright." Nothing could be more convincing.

Commercial Art Practice, though not ponderous, is encyclopædic, a mine of information. No book could more thoroughly supply a particular demand. No book on this subject could give more shrewd advice. Messrs. Knights and Norman even map out the commercial artist's day for him, and I feel would be able to tell him what to wear and what diet is most compatible with the average digestion of his brotherhood.

The age we live in has not a highly developed cosmic consciousness. It cares less for synthesis than for picking things to pieces, and it is perhaps not hard to see how this process gratifies vanity and enables people to live happily without the consolations of the infinite. Messrs. Knights and Norman say: "Stripped of non-essentials, the mental states through which the customer's mind passes in the act of purchasing are, seven, and these are: 1. Interest Aroused. 2. Knowledge is Added to. 3. Adjustment to Needs. 4. Appreciation of Suitability. 5. Desire to Possess. 6. Consideration of Cost. 7. Decision to Buy." They then go on to show how pictures can usefully hasten the transition from 1 to 7 ; but whether all these subtleties are better than " Cats White, Homes Bright," is more than one can be sure of.

But the thirty-nine chapters of *Commercial Art Practice* are almost entirely practical and technical ; it is only the more speculative and " psychological " dicta of the authors that make one want to argue. Moreover the information given is not given too bluntly, and the aspirant will find many suggestions thrown in with the facts, which should prove really helpful.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

Monday, March 10..Aeronautical Society, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.30 p.m. Herr M. Wronsky, " Air Transport." (Joint Meeting with the Institute of Transport).

Automobile Engineers, Institution of, at the Queen's Hotel, Birmingham. 7 p.m. Mr. W. H Goddard, " The Mercedes-Benz Diesel Engine."

Brewing, Institute of, at the Charing Cross Station Hotel, Strand, W.C. 7.45 p.m. Dr. L. Nathan, " Improvements in the Fermentation and Maturation of Beer."

Electrical Engineers, Institution of, at Armstrong College, Newcastle-on-Tyne. 7 p.m.

At Bristol. Mr. L. C. Grant, "The Breaking Performance of High-Power Switch Gear and of a New Form of Quenched-Arc Switch."

Geographical Society, at the Aeolian Hall, New Bond Street, W. 8.30 p.m. Mr. F. Kingdon Ward, " The Eastern Gate to India."

Heating and Ventilating Engineers, Institution of, at the Borough Polytechnic, Southwark, S.E. 7 p.m. Mr. L. J. Fowler, " Some District Heating Systems."

Historical Association, at Sir Walter St. John's School, Battersea, S.W. 8 p.m. Prof. A. E. Levett, " The Medieval Village."

Surveyors' Institution, 12 Great George Street, S.W. 8 p.m. Sir Harry Haward, " Recent Developments in Electricity Supply in Great Britain with special reference to Rural Electrification."

University of London, at Birkbeck College, Bream's Buildings, E.C. 5.30 p.m. Prof. Dr. V. M. Goldschmidt, " Chemical Geology." (Lecture I).

At King's College, Strand, W.C. 4.30 p.m. Prof. E. Prestage, " Portuguese Voyages of Discovery and Empire-Building." (Lecture III).

At King's College, Strand, W.C. 5.30 p.m. Rt. Rev. A. C. Headlam, " Christian Reunion. Lecture II—The Church."

At King's College, Strand, W.C. 5.30 p.m. Prof. R. W. Seton-Watson, " Outlines of British Foreign Policy (1815-80). Lecture VIII—Non-Intervention and Isolation (1866-74)."

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. Albert Aftalion, " La Monnaie et le Change—Facteurs Quantitatifs et Facteurs Qualitatifs." (Lecture I).

At University College, Gower Street, W.C. 5.15 p.m. Prof. O. Meyerhof, " Chemistry in Relation to Problems of Cellular Physiology." (Lecture III).

At University College, Gower Street, W.C. 5.30 p.m. Prof. E. J. Salisbury, " Concerning the Study of Plants."

Tuesday, March 11..Automobile Engineers, Institution of, at the Kings Head Hotel, Coventry. 7.30 p.m. Captain J. S. Irving, " Problems Encountered in Designing the ' Golden Arrow '."

Anthropological Institute, 52 Upper Bedford Place, W.C. 8.30 p.m. Miss M. A. Murray, " The Horned God and Survivals."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. (1) Mr. H. D. Smith, " Reconstruction of Liskeard Viaduct and Scheme for Reconstruction of the Approach Spans of the Royal Albert Bridge, Saltash." (2) Mr. F. Gibbons, " Reconstruction of Approach Spans, Royal Albert Bridge, Saltash." (3) Mr. James Alexander, " Reconstruction of Kent and Leven Viaducts, Furness Section of the L.M. & S. Railway."

Electrical Engineers, Institution of, at the North British Hotel, Edinburgh. 7 p.m. Captain P. P. Eckersley, " Broadcasting by Electric Waves." (Faraday Lecture).

Empire Society, at the Hotel Victoria, Northumberland Avenue, W.C. 8.30 p.m. The Right Hon. Lord Middleton, " A Clue to Successful Migration."

Eugenics Society, at Burlington House, W. 8 p.m. Discussion on " Unemployment." Principal speaker, Mr. W. A. Appleton.

Imperial Institute Cinema, South Kensington, S.W. 5.15 p.m. Lady (Flinders) Petrie, " Flinders Petrie's Researches in the Wilderness of Palestine."

Marine Engineers, Institute of, 85-88 The Minories, E.C. 6.30 p.m. Mr. A. T. Wall, " The Advantages to the Shipowner of Closer Co-operation between the Naval Architect and the Marine Engineer."

Mechanical Engineers, Institution of, at the Royal Metal Exchange, Swansea. 6.30 p.m. Mr. W. T. Body, " Lubrication and Lubricants with special reference to Steel and Tinplate Works."

Petroleum Technologists, Institution of, at the Royal Society of Arts, Adelphi, W.C. 5.30 p.m. Major W. H. Goddard, " The Diesel Engine as Applied to Road Transport."

Photographic Society, 35 Russell Square, W.C. 7 p.m. Annual General Meeting.

Royal Institution, 21 Albemarle Street, W 5.15 p.m. Dr. Charles Singer, " Science in the Middle Ages."

University of London, at Birkbeck College, Bream's Buildings, E.C. 5.30 p.m. Prof. Dr. V. M. Goldschmidt, " Chemical Geology." (Lecture II).

At King's College, Strand, W.C. 5.30 p.m. Prof. J. H. Muirhead, " Prospect and Retrospect in British Philosophy."

At King's College, Strand, W.C. 5.30 p.m. Prof. Sir B. Pares, " Russian History from Peter the Great to 1861. Lecture VIII—The Reign of Nicholas I."

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. A. Aftalion, " La Monnaie et le Change—Facteurs Quantitatifs et Facteurs Qualitatifs." (Lecture II).

At University College, Gower Street, W.C. 5 p.m. Prof. J. C. Brash, " The Growth and Developmental Mechanics of Bone." (Lecture II).

At University College, Gower Street, W.C. 5.30 p.m. Prof. J. de Vries, " Early Teutonic Civilisation." (Lecture III).

Wednesday, March 12..Anthropological Institute, at the Portland Hall, Great Portland Street, W. 5.30 p.m. Prof. J. L. Myres, " The Early Use of Metals."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. Informal Meeting. Discussion on " Land Reclamation Work," opened by Mr. F. M. G. Du-Plat-Taylor.

Fuel, Institute of, at Burlington House, W. 6 p.m. Prof. Dr. W. E. Gibbs, " Smoke Prevention and its Problems."

Geological Society, Burlington House, W. 5.30 p.m.

Metals, Institute of, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 10 a.m. Annual General Meeting. Dr. R. Seligman, Presidential Address. 2 p.m. Dr. T. A. Rickard, " The Early Use of the Metals." Dr. D. Stockdale, " The Composition of Eutectics." Mr. N. P. Allen, " Experiments on the Influence of Gases on the Soundness of Copper Ingots." Mr. W. E. Prytherch, " Gases in Copper and their Removal." Mr. E. J. Daniels, " Unsoundness in

Bronze Castings ' Mr R Genders, Macrostructure of Cast Alloys Effect of Turbulence Due to Gases "

At Thomas's Café, High Street, Swansea 7 p m Mr A Glynne Lobley, ' Electric Heat Treatment Furnaces

University of London at King's College Strand, W C 5 15 p m Prof H G Atkins The Social and Political Ideas of Some Representative Thinkers of the Revolutionary Era Lecture IX The German Thinkers of the Revolutionary Era

At King's College Strand W C 5 30 p m Dr D Subotic The Jugoslavs in the Service of the Spanish Moors

At the London School of Economics Houghton Street W C 5 p m Sir M S Amos Legal Administration in Egypt

At the London School of Economics Houghton Street W C 6 p m Mr C H Costello Office Machinery Lecture VII Office Machinery and the Cost Accountant

At the London School of Economics Houghton Street W C [illegible] p m Dr G H Miles The Problem of Incentives in Industry (Lecture II)

At University College Gower Street W C 5 p m Dr R J Ludford Cytology in Relation to Physiology and Pathology (Lecture VI)

At University College Gower Street W C 5 p m Prof J Steffensen Some Recent Researches in the Theory of Statistics and Actuarial Science (Lecture I)

At University College Gower Street W C 5 15 p m Prof O Meyerhof Chemistry of Muscle in Relation to Problems of Cellular Physiology (Lecture IV)

At University College Gower Street W C 5 30 p m Mr A M Wijk Three Swedish Poets (Lecture II)

Thursday March 13 Automobile Engineers Institution of at the Devonport Technical College Plymouth 8 p m Captain F W Johnson The Inspection of Metals and their Alloys

Asiatic Society 74 Grosvenor Street W 1 [illegible] p m Mr R C F Schomberg, The People of Sinkiang

Electrical Engineers Institution of Savoy Place W C [illegible] p m Messrs H A Humphrey D M Buist and J W Bansall The Imperial Chemical Industries Limited's Steam and Electric Power Plant at Billingham

At University College Dundee [illegible] p m Mr W B Hird The Visit of the Institution to France

Historical Society 2 Russell Square W C 5 p m Mr Herbert Wood The Public Records of Ireland before and after 19[illegible]

L C C Geffrye Museum Kingsland Road E Mr Herbert Cescinsky Walnut and Mahogany Furniture from 17[illegible] to 1750

Mechanical Engineers Institution of at the South Wales Institute of Engineers Cardiff [illegible] 30 p m

At the Hotel Metropole Leeds 7 30 p m Mr S A Main Heat and Corrosion Resisting Steels

Metals Institute of at the Institution of Mechanical Engineers Storey's Gate S W 10 a m Dr D Hanson S L Archbutt and Grace W Ford Investigation of the Effects of Impurities in Copper Part VI The Effect of Phosphorous in Copper Mr R Genders, The Aluminium Brasses Dr C F Elam The Diffusion of Zinc in Copper Crystals [illegible] p m Messrs I Davies and I Wright Protective Value of Some Electro Deposited Coatings Messrs R Lancaster and J G Berry A Note on Zinc-Base Die-Casting Alloys Professor Dr B P Haigh, and B Jones ' Atmospheric Action in Relation to Fatigue in Lead Mr W R D Jones A Note on Metallic Magnesium

North East Coast Institution of E[illegible]ers and Shipbuilders at the Cleveland Institute [illegible] Middlesbrough 7 30 p m Engineering Films The Age of Speed and The 30th Part of a Hair by Messrs Alfred Herbert Ltd

Patentees Institute of at Caxton Hall Westminster S W 8 p m Mr P Marshall The Inventor's Workshop

Photographic Society 35 Russell Square W C 7 p m

Refrigeration British Association of at the Institution of Mechanical Engineers, Storey's Gate, S.W. 5 30 p m Dr A J Smith, "Heat Production and Evaporation as Factors in Cold Storage "

Royal Institution, 21 Albemarle Street, W 5 15 p m Mr J B S Haldane, " Some Problems of Genetics "

University of London, at the Imperial College of Science (Botany Lecture Theatre), Prince Consort Road, S W 5 30 p m Dr W F Bewley, Diseases of Glass-house Plants (Lecture II)

At King's College Strand, W C 5 30 p m Dr W Rose The Great War in German Literature, 1914-1929

At University College, Gower Street W C 5 p m Prof E J Salisbury Concerning the Study of Plants (Lecture II)

At University College Gower Street, W C 5 p m Prof J Steffensen ' Some Recent Researches in the Theory of Statistics and Actuarial Science (Lecture II)

At University College Gower Street, W C 5 30 p m Maj Gen Sir G Aston, ' British Sea Diplomacy—Old and New (Lecture II)

At University College, Gower Street W C 5 30 p m Prof R W Chambers Early Tudor Biographers (Lecture III)

Friday March 14 Astronomical Society Burlington House W 5 p m

Education Fellowship The New at Livingstone Hall Broadway Westminster S W 7 30 p m Mr G H Widdows Open Air Schools for All

Engineering Inspection Institution of at the Royal Society of Arts Adelphi, W C 5 30 p m Mr J J O Neal Deep Well Pumps

Malacological Society at University College Gower Street W C 6 p m

Mechanical Engineers Institution of Storey's Gate S W [illegible] p m Informal Meeting Exhibition of Kinematograph Films

Metals Institute of at the Applied Science Department University of Sheffield 7 30 p m Mr A Glynne Lobley Electric Heat Treatment Furnaces

Meteorological Society at the Institution of Electrical Engineers Savoy Place W C 6 30 p m Dr Fridtjof Nansen The Aims and Objects of the Aeroarctic (Joint Meeting with the Royal Aeronautical Society)

Oil and Colour Chemists Association at 30 Russell Square W C 7 30 p m The Protection of Ironwork on Buildings (Joint Meeting with Boro Oil and Colour Students)

At the Milton Hall Deansgate Manchester 7 p m Mr G F Thompson Colours used in the Rubber Industry (Joint Meeting with the Institute of Rubber Technologists)

Physical Society at the Imperial College of Science and Technology South Kensington S W 5 p m

Royal Institution 21 Albemarle Street W 9 p m Prof G Elliot Smith New Light on Vision

University of London at King's College Strand W C 5 30 p m Rt Rev Archbishop Germanos The Œcumenical Patriarchate of Constantinople as a propagator of the Faith and a stronghold of Eastern Christendom

At King's College, Strand W C 5 30 p m Prince D S Mirsky Russian Lit[illegible] Criticism Lecture IX The Marxists (1900 1930)

King's College (at 40 Torrington Square W C) 5 30 p m Dr O Odložilík "Outlines of Czechoslovak History II Lecture III The Renaissance of Czechs and Slovaks

At University College, Gower Street W C 5 p m Prof J Steffensen, ' Some Recent Researches in the Theory of Statistics and Actuarial Science ' (Lecture III)

At University College, Gower Street W C 5 p m Mr G P Wells, " Comparative Physiology (Lecture IX)

Saturday, March 15 L C C Horniman Museum Forest Hill S E 3 30 p m Mr H N Milligan, ' Monsters of the Deep '

Royal Institution, 21 Albemarle Street, W 3 p m Sir E Rutherford, ' Atomic Nuclei and their Structure " (Lecture II)

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4034 *FRIDAY, MARCH 14th*, 1930 VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> " *We think of the man of science or the artist, if not of the saint, as a being with peculiar gifts, not as one who exercises, more precisely and incessantly perhaps, activities which we all ought to exercise. It is a commonplace now that art has ebbed away out of our ordinary life, out of all the things which we use ; and that it is practised no longer by workmen, but only by a few painters and sculptors. That has happened because we no longer recognise the æsthetic activity as an activity of the spirit and common to all men. We do not know that when a man makes anything he ought to make it beautiful for the sake of doing so, and that when a man buys anything he ought to demand beauty in it, for the sake of that beauty. We think of beauty, if we think of it at all, as a mere source of pleasure , and therefore it means to us ornament added to things, for which we can pay extra if we choose. But beauty is not an ornament to life or to the things made by man. It is an essential part of both.*"
>
> *A. Clutton-Brock.*

A Royal Society of England.—We published a list of the recipients of the Society's Albert Medal in last week's issue. The medal was struck to reward distinguished merit in promoting the arts and sciences associated with manufactures and commerce. In the same week there appeared in *The Times* a very interesting article entitled " Sequel to 1851," and a leader thereon entitled " The True Albert Memorial." " The spiral movement which the reputations of men go up or down has brought the reputation of the Prince Consort out again into the light and up to a level whence it is not likely to decline." For eighteen years Prince Albert was the watchful and active President of this Society, which was at its lowest ebb when he accepted the Presidency, and when he died it was flourishing and real. The Society has ever since had the encouragement and interest of Royal Patronage, and at the present time His Majesty the King and the Prince of Wales are its Patrons, and the Duke of Connaught the President of the Society. Prince Albert recognised that no Society could so fully represent the arts and sciences and emphasize their importance in education. Whatever one's views may be as to the tendencies of the Victorian age and the Great Exhibition we are bound to respect their industry and their regard for quality of workmanship even if their sense of beauty and design was often dull and uninspired.

"At his last appearance at the Sceiety", writes Sir Henry wood in his "History of the Royal Society of Arts," "when, in May, 1861, he presided at one of its meetings, the Prince expressed his regret that of late he had not been able to give to its work the attention and the care he had given in earlier days. The Society of Arts was one of the first public institutions in the country to which he lent his patronage and his help It repaid his attention by being amongst the first public bodies in England to value him at his true worth. For years he was unappreciated, misunderstood, almost unpopular, but by the members of the Society with whom he worked in pursuance of aims and objects on which his heart was set, he was from the first appreciated, understood and esteemed. It is something to the credit of the band of workers who used the organisation of the Society for the promotion of much public good, that they estimated at its true value the character of a man who for long lacked fit recognition at the hands of his adopted countrymen, and whose genuine worth was only fully realised in the closing years of his life among them."

His Majesty the King honoured the Society by accepting the Albert Medal in 1913, and the list of recipients since 1864 is surely notable. There was never a period in the Society's history since 1754 when its services should be more in demand The country's industries require every ounce of concentration and reconsideration to compete with the growing vitality of other countries. Agriculture, on which this country must always be so dependent if it is to survive, needs the application of the latest scientific methods. The Society has always devoted much attention to this matter, more, perhaps, than to some of the more familiar branches of the art. The recent activities of the Society in connection with the preservation of Urban and Rural England suggest that the importance of this side of the work has become apparent ; as *Country Life* well says :—" Modern conditions have made of preservation a new and vitally important undertaking, in part an art, in part a method of government. In a sense it is synonymous with civilisation itself, the old significance of which has been usurped by material progress. Industry, speed, wealth and invention, are not, as the age is in danger of believing, ends in themselves, but means to the appreciation of intellectual and spiritual values of which nature is the source. But the means will destroy the end unless all cultured persons and bodies unite to guard civilisation from the wrong sort of 'progress.' A Royal Society of England can co-ordinate all the forces necessary to unite the nation into something that will have the integrity of the period of 1861 but with a more informed scientific attitude, and a nobler vision of what art really means to the individual citizen."

Advertising.—We dealt in the last issue of the *Journal* with the various efforts of the Scapa Society to discourage unsightly advertisements since 1893. Whether the Bill now in Parliament to enable Local Authorities to deal with any objectionable advertisement is ratified or not, it seems clear that there are sufficient powers already if the public are offended by the present condition of things. We suspect, however, that the great advertising firms will follow the excellent example set by the Shell Mex some years ago, and give instructions to their agents to use educated discrimination in regard to the placing of their advertisements. The motor spirit pump is not particularly offensive in itself ; it is a useful and necessary piece of machinery for giving the traveller oil in the shortest possible time, and if painted a decent colour in relation to its background is comparatively harmless. It is the surrounding untidiness of everything connected with the pumps which is so nauseating. We recollect a very beautiful village where pumps are placed immediately in front of two very beautiful old gate piers. The colour of scarlet pumps on a background of Tudor bricks is a real offence. It would have been quite easy, and no more expensive to have placed these behind the piers. A preliminary consultation between the local agents of Shell Mex and one or two educated people of the village in cases of this kind would be very helpful, and we are sure that the principals in all great firms would welcome such co-operation and interest. In regard to mere advertising we recall, all over the country, isolated woe-begone hoardings, which must long ago have ceased to have any value except as an irritant There is a lovely village in Warwickshire almost entirely free of advertisements, so that a large board in a rather tottery state, bearing the name of a well known firm suggests the wrong sort of advertisement. In Cambridge we noticed several quite delightful cottages in the town plastered entirely with huge advertisements, the names of which we unfortunately forget. Recently we have noticed everywhere the evidences of rival advertisement campaigns proclaiming the merits of Beefex and Bovril. These advertisements have spoiled so many pleasant places that one wonders whether to some of us either beverage will ever taste the same again. Surely the merits of these particular articles would be more pleasantly conveyed to the Fellows of this Society through the advertisement pages of their newspapers, or even of this *Journal*.

The Late Charles Whibley.—We are reminded of his championship in Blackwood's of the Society's efforts to save for the district of Birmingham the home of William Shenstone. Is there no-one in this district who will follow the excellent example of Sir Julien Cahn in Nottingham, and save this literary shrine of the 18th century personality for the nation ? Such a gift might well be associated with the name of Charles Whibley, whose last literary effort was to plead for the preservation of William Shenstone's home. *The Evening Standard* referring to Charles Whibley says:—"A great link with the immediate and remoter past has been severed by the death of Charles Whibley—that rich eighteenth century Tory who liked old books, old manners, old wine, and old companions, and who disliked all forms of what he called 'woolliness', in which he included Liberalism, æstheticism, the League of Nations, and any doubts about the white man's burdens. As a collaborator with Henley, as the brother-in-law of Whistler, as the intimate friend of Mallarmé and Valerié, as the admirer and companion of Lord Northcliffe, Charles Whibley was in touch with all that was most vital in politics and literature from 1890 to 1914. And in his later years he was glad to startle the undergraduates of Jesus College by the robust intolerance of his opinions, and to soothe them by the essential kindliness of his sympathy. He is not a type that we are likely to see again."

Ashtead Potters.—We have already said that though Sir Lawrence Weaver was not a Fellow of this Society, he was very active in his interest in helping any work connected with industrial art, and expecially in connection with the Society's work at West Wycombe. As Chairman of the Executive Committee of the Haig Memorial Trust, he was responsible for arranging for the restoration of a group of cottages there for the purposes of the Trust. His friends feel a special obligation laid on them to carry on his untiring and self-sacrificing work in connection with the Ashtead Potters, founded by him to provide work for disabled ex-service men. They are anxious to increase the output of the pottery and to see that it is made a permanently sound business undertaking. There is no question as to the beauty and quality of the products, and we hope that the Fellows of this Society will interest themselves in making this excellent work more widely known.

Drama and Music.—Nyota Inyoka, the Indian danseuse, is giving a series of remarkable recitals at the Arts Theatre. One has to see her to realise again that dancing is the most natural and untrammelled of all the arts. She seems to combine the grace and beauty of modern dancing with the most fundamental meaning of the art--the interpretation of the history and the character of a nation in movement. Dancing has always been the oldest expression of grief or joy or celebration and this little dancer in her early Indian prayer dances or the very exquisite Egyptian frieze seems to give a real insight into the national character of thousands of years ago. Genius is a curious thing; it cannot be put into words or conveyed second-hand, but Nyota Inyoka has real genius from her golden turban to the tips of her toes: rhythm, beauty and colour—how seldom we find them all, and how rare and refreshing when we do!

"Frankenstein," from the novel by Mary Wollstonecraft Shelley, is being played at the Little Theatre. It is an extremely difficult subject to tackle, though it is so dramatic, and it is some credit to the author that she has been able to make it into a play at all, but it is a great pity that having succeeded so well in some very difficult situations, she should have dropped, in some of the simpler ones, to an extraordinary level of banality and stilted Victorian dialogue. But the true interest of the play lies in the performance of Mr. Hamilton Deane as Frankenstein; this character has no precedent in literature, so that the actor has to create every line and movement himself. Every intonation, every gesture has to be evolved, and his performance carries the play by sheer force of acting, in the truest sense of the word. The play should be seen for this performance alone. Mr. Henry Hallett plays the tortured master of Frankenstein very well indeed, managing to make a badly-written part dramatic and convincing. It seems a great pity that the rest of the cast are not up to the level of these two, and that some of the scenes are so badly written. Most of the plays on the London stage are variations on one or two themes and it is refreshing sometimes to see an original thought even if it does not quite succeed. " Frankenstein " only is not out to horrify (which it does most successfully in the first act), but there is also an interesting idea behind it.

Art. -It is with rather mixed feelings that most lovers of the Russian Ballet will visit the Memorial Exhibition of Russian Ballet Art at the Claridge Gallery —there is a dreadful finality about the word " memorial " even though, we hope, it only applies to one phase, which sadly enough has closed with the death of Diaghileff. Though the English are supposed to be unromantic and inartistic, they have always had a tremendous and almost sentimental feeling about the Russian ballet. The first night of some special favourite in London was always a scene of immense enthusiasm, and walking round this exhibition we wonder what the future holds for dancing. Who is there to succeed Nijinsky, Karsavina and Lifar, or even, like Diaghileff, to give the chance to those who would perhaps be able to succeed them, ? We feel his personality in everything, and looking at some of the faded costumes and at the photographs and designs at this exhibition we are once again at the " Boutique Fantasque " or caught up on the rhythm of the " Three Cornered Hat," or watching Lopokova in " Les Sylphides " blown across the stage like a white cloud.

The exhibition is under the patronage of Mdme. Tamar Karsavina and we owe her and the promoters a great debt of gratitude for this memorial of a great company of artists and designers.

R. O. Dunlop.—An exhibition of this artist's work is being held at the Redfern Galleries. Mr. Dunlop is a modern in rather a special sense. So many of his contemporaries are consciously or unconsciously copyists, but he has evolved a curiously interesting style of his own, which seems to have no connection with any school of painting. He has little regard for purity of line or colour and uses paint in a rather contemptuous way, and yet with such a sure touch that what seem to be a lot of haphazard dabs of muddy colour do emerge into pictures which have a considerable amount of vigour and beauty. We liked particularly " Jean " (profile), some of the flower pictures, and No. 7 " Self Portrait."

Miss Eve Kirk, on the other hand, at the Paterson Gallery, Bond Street, uses colour with extreme simplicity and a quiet beauty that is rather refreshing. Hers are not exciting or striking pictures, but they are painted with real feeling for the subject (mostly harbours and old French village streets), and some of them have real distinction.

Newstead Abbey. We quote the following from *Country Life* :- " The Royal Society of Arts has once again incurred the gratitude of all who care for the preservation of England and her historic buildings by acquiring Newstead for the nation, Sir Julien Cahn, one of the Society's Fellows, having generously consented to advance the purchase money. ' Newstead Abbey,' Horace Walpole once said, ' is the very abbey.' We may not quite share his opinion to-day, but, looking through his spectacles, it is easy for us to see what he meant. Newstead was a real Strawberry Hill and something more. Here was everything a genuine ' Goth ' could desire—the ruins of an abbey (it was a priory really, but that did not matter), a baronial hall, cloistered walks, vaulted crypts, traceried windows, battlements and turrets -everything, including an actual death chamber It seems almost inevitable to us, looking back, that such a place should have given birth to a great romantic poet. And Byron, in his theatrical way, appreciated this. But it did not prevent him selling Newstead to pay his debts. Although parts of the building date from after the poet's time, the romance and beauty of the place remain unimpaired. Newstead now belongs to the nation, but in a much more real sense it still belongs to the Byrons, to Sir John Byron who built the house, to the ' wicked ' Lord Byron who dissipated the family's fortunes and, most of all, to Byron the poet."

English Country Inns. *Good Housekeeping* this week has a lively article on this subject in which it says : " In spite of the ' See Britain First ' campaign more and more people choose to spend their holidays abroad. Does the blame lie with our average middle class hotels, which for a price that on the Continent would secure perfect comfort, too often supply poor accommodation and monotonous cooking ? Perhaps if managers took a lesson from our French neighbours, they could make their hotels worthy of our countryside and attractive to visitors." Again it says : " The average tourist (and it is the average tourist we need to attract) is not going to any place however beautiful, picturesque or storied where he will have to pay high prices for unsatisfactory accommodation."

This is a very much discussed question just at present; travelling is so much easier, that even if people do not always spend their holidays abroad, they are able to compare and criticise foreign and English methods. The English hotels must make an effort for their own sake and realise that we cannot always put up with cold ham, bad service and hard beds. Why not an occasional variation in diet or a really charming bathroom ? There is a fortune waiting for the enterprising innkeeper !

West Wycombe has a derelict hotel and inn. Surely if motorists knew that if they pulled up there they could get wholesome fare, they would soon do so and it would be a great opportunity to illustrate what could be done. The Automobile Association is doing its best under the greatest difficulty. The traveller does not want fancy palm lounges; he wants cleanliness, simplicity and good food.

English Sculpture. We should like to call special attention to Mrs. Arundell Esdaile's Lecture on March 19th, with Mr. C. R. Peers in the Chair. Mrs. Esdaile has done more than anyone to revive an interest in English sculpture, and to remind this country that it has produced authentic workers in the Art which it seems to have forgotten. Her various books on English sculpture should be read by everyone interested in an art, which up to the nineteenth century was associated intimately (as all sculpture should be that has any vitality) with the mistress art of architecture. A proper understanding of this relationship would save us as a nation from ill-considered judgments on men who are working in England to bring back the art of sculpture to a more plastic relationship to the art of building. Mrs. Esdaile will no doubt remind her audience that such names as Roubiliac, Wilton, Bacon, Banks, Flaxman, and Nollekens have all been associated with the Society in their day.

NOTICES

NEXT WEEK

WEDNESDAY, MARCH 19th, at 8 p.m. (Ordinary Meeting.) MRS. ARUNDELL ESDAILE, "The Portrait in Later Monumental Sculpture." CHARLES REED PEERS, C.B.E., F.S.A., F.B.A., will preside.

FIFTEENTH ORDINARY MEETING

WEDNESDAY, MARCH 5th, 1930. SIR WILLIAM WATERS BUTLER, Bt., F.C.S., Past President of the Institute of Brewing, in the Chair. A paper on "Brewing as a Branch of Science" was read by **Professor Arthur R. Ling**, M.Sc., School of Malting and Brewing, University of Birmingham. The paper and discussion will be published in the *Journal* at an early date.

ALBERT MEDAL

The Council will proceed to consider the award of the Albert Medal of the Royal Society of Arts for 1930 early in May next, and they therefore invite Fellows of the Society to forward to the Secretary on or before Saturday, March 29th, the names of such men of high distinction as they may think worthy of this honour. The medal was struck to reward "distinguished merit in promoting Arts, Manufactures, and Commerce."

A list of those who have received the medal since its institution in 1864 was printed in the last number of the *Journal.*

HISTORY OF THE ROYAL SOCIETY OF ARTS

Further copies of the History of the Royal Society of Arts by the late Sir Henry Trueman Wood, the existing supply of which was recently exhausted, are now available, and can be obtained, price 15*s.* net, on application to the Secretary. The History, a large octavo volume of 558 pages with a large number of illustrations, gives a well documented account of the many and various activities of the Society from its foundation in 1754 to the year 1880.

PROCEEDINGS OF THE SOCIETY

TWELFTH ORDINARY MEETING

Wednesday, February 12th, 1930

Mr. Forest Hewit, Director, Calico Printers' Association, in the Chair.

Mr. G. K. Menzies (Secretary) announced that Lord Ebury, who had promised to take the Chair, had been prevented from doing so by a serious hunting accident. At very short notice Mr. Forest Hewit had been kind enough to take his lordship's place.

The Chairman said that Mr. Holbrook Jackson was a man of many parts. He was well known as a writer of distinction, and one who, he believed, was the first to write discriminatingly of Bernard Shaw. He was one of the first to say in print that

Bernard Shaw was a genius when all the world was inclined to think otherwise. What the lecturer had said twenty years ago the whole world was saying to-day. He had also written a book on William Morris, which indicated that he had the capacity for dealing with matters of art. He had written an outstanding book on *The Eighteen Nineties*, and was well qualified, also, in business, as he was the Editorial Director of the National Trade Press, the proprietors of twelve important trade papers, including *The Drapers' Organiser;* he therefore approached his subject from a literary, from an artistic and from a commercial point of view.

The following paper was then read:—

COLOUR DETERMINATION IN THE FASHION TRADES

By HOLBROOK JACKSON,

Editorial Director, The National Trade Press, Ltd.

Many people believe that the determination of fashion colours is a mystery whose secrets are monopolised by a hierarchy of French fashion experts who deliberate in conclave, and ultimately communicate the result to an anxious and grateful world. I am sceptical of such mysteries and come before you as an unabashed heretic. The autocratic colour prophet is as legendary as the notorious Mrs. Harris: "There ain't no sich person." The mystery of French colour prediction is largely a question of co-operative effort combined with astute press propaganda. Good taste and judgment play their part. But the autocracy of colour persists in the main by default of opposition rather than by inimitable gifts or exclusive knowledge. This opinion has a growing number of supporters. In America it is represented by the Textile Colour Card Association, and in England by the British Colour Council, whose coming is a guarantee that the handicap of our present subjection will not remain unchallenged.

I know of no more curious fact in commercial history than the pre-war indifference of England to the potentialities of synthetic dyes. This is more surprising when we recall that modern commerce was born here, and that an Englishman, William Henry Perkin, distilled out of coal tar the first synthetic colour. Perkin's discovery of aniline mauve in 1856 was the beginning of a new era for textiles, second only in importance, in its ultimate effects, to the invention of the power loom. The power loom made mass production possible, and synthetic dyes liberated colour.

Hofmann, Perkin's master at the Royal College of Chemistry, was so impressed by the discovery that, six years later, he told the Jury of the International Exhibition that costly dyes, hitherto "the tributary of foreign climes," lay in the coal beneath our feet, waiting to be drawn forth, even as the statue lies waiting in the quarry; and that "instead of disbursing her annual millions for these substances England will, beyond question, at no distant day, become herself the greatest colour-producing country in the world."[1]

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[1] Qt. *Quest for Colour*, Mouilpied (1924), 15.

At the time, however, England must have been suffering from an attack of colour-blindness. Our manufacturers failed so completely to recognise that coal was fossilised colour, and that the intermediates in the process of extracting colours included invaluable commercial products and high explosives, that leadership at the dawn of the age of industrial chemistry passed to Germany.

Whilst we burnt our black diamonds and imagined comfortably that our commercial security was invincible, Germany exploited the epoch-making discovery of Perkin, and we were only awakened from our dream by the noise of the Great War. Since then we have been fighting hard to catch up to Germany, with her three thousand by-products of coal tar, more than half of which are dyestuffs. I refer to this incident because control of fashion colours is related to that essential industry. It is true that France and not Germany has secured leadership in the prediction of fashion colours ; but there are special reasons for this which I shall presently examine. It is none the less true that the efforts of our fashion colourists to be independent of rivals will be strengthened by co-operation with our new and progressive dyestuffs industry.

Whether this be so or not, it is a fact that the growth of the British fashion trade is handicapped by foreign colour propaganda. At the moment we are overwhelmingly dependent not only upon French opinion, but upon the willingness of French colour experts to release their predictions in time for our manufacturers to make their seasonal arrangements. This dependence is damaging to our prestige and our pockets. It is not good for any industry to dance to the tune called by a competitor. Leadership is desirable, independence essential. This handicap exposes our fashion goods to attack on the grounds of both precedence and originality, and our manufacturers and distributors to uneconomical production and buying. So long as this condition remains we shall be in a position of inferiority.

There is all the more reason that the problem should be faced with courage, because, in the first place, colour and form in fashion are equally important, and, in the second, because fashion is exploiting the modern love of change and variety in an ever-increasing number of classes of merchandise in most of which colour is playing a profitable part. The popular mind dismisses colour with women's outer garments ; but every scrap of women's clothing for all occasions has now a colour context, and there is also an extraordinary development of pigmentation in the clothing of men. But these fashionable heights no longer display themselves in isolated grandeur. They are no more than incidents in the pervasion of colour. Colour, like a fairy godmother, is insinuating her influence universally. A modern store is a kaleidoscope whose chromatic scale is as variable as the weather. All classes of merchandise, fabrics and furniture and fountain pens ; motor cars and sweetmeats ; cameras and cosmetics, change their colours like the flowers in a well-ordered garden. Even foodstuffs have joined the dance. The public chooses its eggs and butter and cheese, its beer and bacon, by colour. A Danish firm has issued a colour card giving no fewer than eight different shades of yellow for the use of provision merchants when laying in stocks of butter. Different tints for bacon and cheese are fashionable in different places, and kippers and sausages and potted meats have each a carefully-considered colour scheme. Some of the colours have names, such as "Bismarck Brown" (appropriately for sausages), "Fillet Golden Yellow" and "Kipper Brown," which might arouse the envy even of the textile trade.

This sudden and fascinating colouration is neither new nor unnatural. It has occurred before. There have been other coloured periods, notably in the Middle Ages and the Italian Renaissance, and the ancient Hebrews must have lived in a riot of primary hues. From another point of view our most cunning ingenuity can never hope to compete more than remotely with the inventiveness of the sun, who has dappled the whole of life with the infinite variety of its own prismatic rays.

Apart from these considerations the use of colour is characteristic of humanity. It may even be said that woman's passion for colour was a cause of civilisation, or of one phase of it; for it has been suggested that the preference for malachite as a cosmetic by early Egyptian women led to the discovery of copper, of which it is a by-product. Elliot Smith argues that "a fragment of malachite, or the cosmetic paste prepared from it, dropped by chance into a charcoal fire, would have provided the bead of metallic copper and the germ of the idea that began to transform the world more than sixty centuries ago."[2]

I do not think this a fantastic idea because, as I said just now, colour has always played a dominant part in human activities. It could not have done so unless it was natural, because however hard we try we can never do anything outside of nature, and the more we look at natural objects the more we are impressed by the leading part played by colour.

So dominant a part has colour played that its terminology has entered into the idiom of our language. We have all at times been a little bit "off colour," and rejoiced again when we felt "in the pink;" some of us have been "green with envy," and I hope fewer "yellow with jealousy;" we have looked at life through "green spectacles," felt "blue," and perhaps cured ourselves by dancing "the blues;" enterprising financiers operate by an instinctive recognition of "the green in the eye" of their victims; and many people would be much richer to-day if they were as quick in recognising the "yellow streak" in such gentlemen rather than accepting them at their own valuation as "white men;" sometimes we "see red," or fall into a "brown study," and we all hope to live to a "green old age."

It is not known when colour and fashion came into partnership; but the event is probably older than we imagine, coincident, indeed, with the use of colour by those primitive men who are remembered by their drawings on the walls of the caves of Altamira. Primitive peoples have a keen colour sense, and it is probable that the first fashion colours were used in tattooing or for cosmetics.

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[2] *Ancient Egyptians,* 10.

It is debatable whether Joseph's coat of many colours[3] was an indication of fashion in ancient Israel, but there can be little doubt that fashion was already operating at a later date, for we possess records of " numerous minor variations in the cut and colour " of dress in that ancient land.[4] But, in the main, fashion in ancient times, among both civilised and primitive peoples, was static, style and colour being determined by tradition for the purpose of distinguishing sex and class, or for ceremonial purposes. All the women in ancient Egypt from the 4th to the 18th Dynasties wore " a plain diaphanous garment in white, red or yellow," without regard to class, but among the Bedouins the traditional garment was a woollen *jubba*, which is white for men and indigo for women.[5] In ancient Greece the rhapsodists who chanted Homer in the public places wore blue when they recited the *Odyssey* and red for the *Iliad*.[6]

The movement, however, has always been from the static to the dynamic, and considerable changes in taste are at present taking place among surviving primitive peoples, as well as among the members of the older of the more static civilisations. These changes have often been made under protest. It was said that the Romans lost their power when they discarded the *toga*. John Evelyn in the seventeenth century protested vigorously against the growing mutability of fashion, expressing the opinion that " the Swiss had not been now a nation but for keeping to their prodigious breeches."[7] The persistence and prosperity of the Swiss nation ought to be an encouragement to those who have to combat the opinions of conscientious objectors to fashion. But in spite of protests fashion has successfully played into the hands of an ineradicable desire for change. Nowhere is this more marked than in the variations of colour preferences.

In the Drapers' Company there are records which prove that the colours of a style so immutable as that of the liverymen changed no less than six times between the years 1483 and 1520.[8] Changes of the kind were regulated. In Britain a sumptuary law was passed before the Christian Era " ordering the peasantry and soldiers to have their garments of one colour only, officers of two colours, commanders of clans three. . . . . the royal family being allowed seven."[9] It is safe to presume that with the arrival of the Saxons and the knowledge of dyeing and weaving greater variety was encouraged. From that time variation continued. In the days of the Plantagenets only the merchants were soberly clad ; most people blossomed into blues and greens and yellows and reds, " often all four at a time."[10] The movement towards variable fashions was general throughout Europe, and since communications with the Continent were then frequent, interchanges of influence were probable. These influences again did not pass without protest,

[3] *Genesis* XXXVII, 23.

[4] *En. Brit.*, " Costume."

[5] *En. Brit.*, Op cit

[6] *Apotheosis*, Cuperus, Qt Evelyn, *Memoirs*, II, 265.

[7] " Tyrannus," *Memoirs*, II, 321.

[8] Qt. *Dyer & Calico Printer*, Feb. 20th, 1907, 32.

[9] *History of English Dress*, Hill, Vol. I, 7.

[10] *Ib.*, 88.

especially when one country unduly imposed its tastes upon another. At the same time there is no trace that fashion has ever caused a war, although wars themselves were as fashionable then as they are unfashionable now. John Evelyn wrote his curious pamphlet, *Tyrannus*, in the year 1661, to protest against the influence of French fashions, and he went so far as to bring his protest to the attention of Charles II, with apparently beneficial results. He went even further by arguing that English fashions should be encouraged on business grounds, and in order to bring this about he came forward as a protectionist.

The fashion enterprise of the French has menaced our industry on more than one occasion. Over a hundred years later the Honourable James Howard wrote a comedy, *The English Monsieur*, for the purpose of satirising the dandies of the day who were playing the " sedulous ape " to French tastes.

Changes in fashion have two main causes : one, natural ; the other, artificial. Each is possible because, as Aristotle pointed out, man is the most imitative of creatures, and the pleasure felt in things imitated is universal.[11] This instinct operates naturally when we imitate each other, and it is exploited artificially by organised fashion propaganda. Unless, however, there were an underlying willingness to be influenced, fashion houses would be put out of action. At the same time all is not plain sailing, for, although general fashion tendencies can be defined, no fashion is generally accepted by all classes at the same time. Paradoxically, a popular fashion is *demodé*, because when leaders of fashion achieve a following they desert their followers.

There are instances of plebian styles influencing fashion, as when the leaders of the French Revolution discarded the patrician wig for the natural hair and short crop of the proletariat, and, in the Russian Revolution, ardent Communists of the professional classes affected the smock of the *moujik*, a fashion encouraged by Count Tolstoy. But such fashions of the extreme " left " are always a little fantastic, like the sartorial posturing of art students and undergraduates. At the same time it must not be forgotten that " Oxford bags," in various tints, were an undergraduate stunt which became a vogue. A significant instance of influence from the East End of the fashion scale is the belief that the mauve shades recently popular among the dandies of the West End were a reflection of the tastes of the bright young men of Whitechapel. But, in the main, fashions begin at the top, although they no longer stay there.

In the first class, a queen, an actress, or a courtesan may set a fashion. Catherine de Medici appeared so becomingly in crimson velvet that her distinction was threatened and " a law was passed forbidding any woman not a princess to wear a gown wholly of crimson."[12] During the Renaissance in France Ann of Brittany anticipated a modern style by setting a fashion for short skirts in order to reveal legs of which she was, I hope justly, proud ; and she further changed, by example, the use of scarlet, which was the fashionable colour for the brides of the time, to white, and white, which was the fashion for mourning, to black. Marie Antoinette adopted a chestnut brown and the colour immediately became a rage;[13] and at another time the colour of the queen's hair set the fashion for a new shade of blond. In our own country, Queen Victoria's prolonged mourning for the loss of her Consort made sombre colours fashionable.

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[11] *Poetics*, Trans., Butcher IV, 2-3

[12] *Psychology of Dress*, Parsons, 199.

Men's fashions have been equally influenced by princes. The followers of Alexander the Great "held their necks awry" because he did, and when his father, Philip of Macedonia, "wore a fillet about his forehead for a wound which he had received," all the court wore fillets until the King was cured.[14] Charles II brought from France styles which became popular at Court, and when he discarded them for "a comely dress, after the Persian mode,"[15] a new fashion was born. The Prince Regent, like Hamlet, Prince of Denmark, was

The glass of fashion and the mould of form,
The observed of all observers.[16]

Edward VII set the masculine pace in Saville Row, and what the present Prince of Wales wears to-day the Empire and the United States of America wear to-morrow. The Prince has had more influence in breaking down the colour bar of men's clothes than anyone else, for his appearance on the golf course in a polychromatic sweater was the signal for the young men of two hemispheres to burst into a symphony of colour like nothing since the days of the Stuarts. But even princes have not possessed the power of such an autocrat as Beau Brummel, who imposed his exquisite sense of form and colour upon the dandies of the world and made London the metropolis of masculine modes, a distinction it holds to this day.

Stage favourites are recognised fashion influences. Two famous French actresses, Mars in the 18th, and Rachel, in the 19th century, popularised yellow; and even more influential are the beauties of society and the favourites of kings. It is well known that the styles adopted by the Pompadour and Madame du Barry were instantly accepted by the smart sets of their periods, and that red umbrellas were carried by all classes of women in 1870, after the fashion had been set by a Parisian *demi-mondaine*.

It would be wrong, however, to conclude that fashions have been influenced only by persons. A picture or a flower has been known to alter the trend. The shade known as "Rose du Barry" was inspired by the portraits of Madame; "gobelin" blue came from the Gobelin Tapestries, and "Jacqueminot," a shade of red, was taken from the rose first grown by the French horticulturist of that name. Influences derived from art movements, which were themselves fashions, are not uncommon. Historical events, particularly wars and revolutions, have played their part in the tale of this restless passion. A good instance of the first is the Aesthetic Movement in England, when artists and men of letters engaged in an open conspiracy to make us live beautifully. William Morris revolutionised the decorative arts by means of fashion, *malgré lui*, and Oscar Wilde attempted to bring about reforms in dress by appearing in public in a plum-coloured velvet coat, knee breeches, and a sunflower. The commercial consequences of this movement were momentous, for the New Art, as it was called, influenced the whole of Europe, and shops came into existence to meet the demand for ornaments in *l'art nouveau*, and for fabrics in " art " colours. The reputation of the firm of Liberty was built up under the influence of this movement, and " Liberty " frocks and " Liberty " shades, reflecting the designs and colours in the pictures of Kate Greenaway and Burne Jones, were the recognised styles for what were called " artistic " people. In the eighteen eighties this movement was satirised by Gilbert in *Patience*. Those who were not in the movement resented its affectations, which they looked upon as anæmic and degenerate. Bunthorne, a caricature of Oscar Wilde, is stigmatised as :

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[13] *Psychology of Dress*, Parsons, 210.
[14] Evelyn, *Tyrannus*.
[15] Evelyn, *Diary*, Oct. 18th, 1666.
[16] *Hamlet*, III, 1.

A most intense young man,
An out-of-the-way young man,
A greenery-yallery, Grosvenor Gallery,
Foot-in-the-grave young man.

But, in a famous soliliquy, he confessed that he was an imposter and that, in spite of his artiness, he was " not fond of dirty greens by any means."

The modern movement in colour, with its brilliancy and variety, is largely the result of the modernist art movement. Fashion began to be influenced by the Russian Ballet and the settings and costumes of Leon Bakst in 1910, and the close relationship between that superb theatrical event and fashion is emphasised by the fact that some of Poiret's earliest successes were achieved on its stage. Later came the influence of the Italian Futurists, and it was not long before adaptations of their designs and colours became popular under such names as " futurist " or " jazz." The influence of modernism proceeded until with the arrival of Picasso and Cubism, and the later forms of Expressionism, a complete revolution in the decorative arts has been achieved in which manufacturers and merchants have very wisely been content to take their cue from the artists.

During the French Revolution " fire-coloured " shoes, ribbons, caps, fans and walking sticks were the vogue. After the war of 1870, Worth issued an orange shade called " Bismarck enragé " and a grey called " Cendres de Paris."[17] The Great War enforced economy of colour because coal-tar was being turned into T.N.T. instead of prismatic hues. The fashion history of the War is written in the names of such shades as Poilu, Joffre, Cossack and Nivelle,[18] which were sober greys and browns. At the conclusion of the War there was a very natural swing of the pendulum to colour enterprises which would have astonished the gayest of our ancestors.

Although it is possible to trace the origin of certain colour tendencies, it is not

[17] *The House of Worth*, p.8

[18] *The Drapers' Organiser*, " Colour Forecasts " 1916 and 1917.

so easy to account for sudden crazes which appear to be uninspired by trade and unpremeditated by the public. Every now and then a colour becomes epidemic. In 1874 there was an epidemic of green, a colour which women in England were said to believe unlucky. Every shade of this colour was popular: verdigris, frog, bottle, and sage,[19] and quite recently there was a spontaneous and wide-spread rage for "almond green." One of these days someone may discover that each period in history has its specific colour. Already the last decade of the nineteenth century, when "yellow became the colour of the hour, the symbol of the time spirit,"[20] is sometimes called the "Yellow Nineties." Richard Le Gallienne noted this characteristic in an essay which he called "The Boom in Yellow."

The naming of colours is as interesting as it is complex. But no other chromatic scale than that adopted by Isaac Newton for the solar spectrum has yet found acceptance, although his discovery that seven dominant colours were derived from white light, and all the shades from them, would seem to indicate that a mathematical classification would have been possible. This, however, has not been so. For two hundred years physicists have been making attempts to solve the problem, and if Le Blond failed in 1735, before synthetic dyes came, how much more difficult is the task to-day? I do not, however, agree with those who think the problem insoluble.[21] Few things are ultimately impossible to science, and the shade cards of the dyestuff makers of both England and Germany have already begun to blaze the trail. But my business is with classification for fashion purposes; a specialised branch of the broader problem with difficulties and complexities of its own.

Nomenclature is the first ditch we have to jump, and the greatest confusion prevails among the jumpers. The doctrine of *laisser faire* had never a better playground. Anybody is free to call a colour anything he likes. The result is chaos. A few years ago, when "Mary Blue" first became fashionable, no less than seventeen different shades answered to that name. To some extent this is inevitable, because competition dictates the conditions, but that is no reason why there should not be an authoritative index of colours which could be consulted as a court of appeal in the interests of economy and convenience.

It is one of the curiosities of philology that colours have practically no original nomenclature. They are all, including six of the colours of the solar spectrum, named after something else, and so great is the demand for colour names that all the philological resources of nature and art have been commandeered for the service: the earth, the sea and the sky, and all that in or on them is.

There is a prevailing opinion that giving colours fancy names is a new craft. This, however, is an illusion, due to the fact that the number of fancy names has grown with the number of shades made accessible by chemical science. Most of the names are as inexact but not always as charming as Homer's famous reference to the " wine-dark sea," or Shakespeare's " purple testament of bleeding war."[22] The Charter given to the Drapers' Company by Queen Elizabeth, in 1587, gives us a glimpse into some colour names then in use, such as " woddin black, mathrid black, russette ashe, tawnye, French greene, grass greene, popmayos, murraie, vyolet, silver and watchett."[23] It is certain that there was a keen colour-sense in the Elizabethan era, and many attempts were made at naming shades. One occurs in *A Midsummer Night's Dream*, when Bottom the Weaver, who has been persuaded to play the part of Pyramus, asks : " What beard were I best to play it in ? " " Why, what you will," says Peter Quince. " Then," says Bottom, " I will discharge it in either your straw-colour beard, your orange-tawny beard, your purple-in-grain beard, or your French crown-colour beard, your perfect yellow."[24]

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[19] *Dame Fashion*, Price, 143

[20] *The Eighteen Nineties* Holbrook Jackson, 46.

[21] Maurice Boigey says, "it is a task above our capabilities," *Science of Colour*, Trans., J. B. Hewitt, 23

The fashion traders of the seventeenth and eighteenth centuries displayed a topical freedom of nomenclature which has rarely been equalled. In the seventeenth century we hear of " Sad Friend " and " Sick Spaniard," " Scratched Face," " Glad Widow," and " Kiss me Darling," all of which are derived from some event of the moment, theatrical or social. At the close of the eighteenth century in France, before the Revolution, fantastic names had a considerable vogue. A combination of apple green and white stripes was called " The Lively Shepherdess." Names for trimmings and other modish articles were much more fantastic than those used to-day, and they possessed a playfulness which ours lack. Such names as " Indiscreet Complaints," " Great Reputation," "Unfulfilled Wish," " Stifled Sigh," " Preference," " Agitation," " Regrets," " The Feeling," " The Sweet Smile," and " The Vapours,"[25] then used for colours are now reserved for jazz tunes. " Puce," the French word for flea, dates back to the same period. Its origin is said to have been the not very gallant comment of Louis XVI to his queen, Marie Antoinette, who had appeared at Court in a robe of violet-brown taffeta. The King complimented her majesty, and called the new shade " flea colour " (*couleur de puce*), obviously a blue-blooded flea. The shade became so popular that dyers and dressmakers kept the pot boiling by devising all manner of names, in the same key, for variants, such as " Old Flea," " Young Flea," " Flea's Back," and even " Flea's Thigh."

Parisians rejoice to live in the moment, and it is not surprising that their colour names should be topical and colloquial. The burning of the opera house in the Palais Royal induced such names as " Burnt Opera," " Opera Fire," " Opera Smoke," and " Embers ; " whilst other local events at about the same time were the occasion for such adventures as " Canary's Tail," " Indiscreet Tears," " Suppressed Sighs," " Pigeon's Throat," " Gutter," " Paris Mud," and "Nymph's Sigh." But none of these is more exciting than a fashionable London colour of 1830 which bore the alarming name of "Hell Fire,"[26] and was much in favour among the dandies.

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[22] *Richard II*, iii, 3.
[23] *Dyer & Calico Printer*, Feb. 20th, 1907, 32.
[24] Act I, Sc , 2.
[25] *Psychology of Dress*, Parsons, 210-11.

Colour names of to-day have gained in precision what they have lost in liveliness. Those produced on the main French card are perhaps less original than the rest, but there is an obvious striving to keep as close to the colour as possible, the main difficulty being that many French names have very little meaning outside of France. The names used by the Basle Syndicate are more practical, but they often misfire as descriptions. "Chambre d'Amour" has a nuptial flavour, but its use for a shade of green is probably an elliptical joke. "Serenade," "Caprice," "Sans-Souci," "Apache," "Darling" and "Deliverance" might be applied to any shades with equal success. "Gin" and "Whisky" have little colour content, and are probably introduced as concessions to British tastes, or American complexes. "Alleluia" should win over the more stylish tambourinists of the Salvation Army.

The American cards reveal much ingenuity and a commendable effort towards precision, especially in such compound words as "Moonmist," "Olivesheen," "Pencilwood," "Silverwing," "Rosemist" and "Shellbloom." These cards have recently made excursions into the terminology of the bill of fare with "Custard," "Piecrust," "Baba au Rhum," "Gateau," "Brioche," and "Brown Sugar," all of which have colour value

The British cards on the whole keep close to the colour meaning, and also to English words. The latest swatch of The Bradford Dyers' Association Ltd. has avoided fantastic names and in a good many instances kept to words of one syllable such as "Tarn," "Dale" and "Foam," but the longer words equally suggest their colour meaning, as, for example, "Covey," "Bunker," "Beeswing," "Mornglow," "Poppyland" and "Midnight." J. and J. McCallum, Ltd., a branch of the British Cotton and Wool Dyers' Association, also recognise the need for simplicity and correct colour suggestion, and many of the names chosen achieve a considerable degree of precision. The producers of this card now and then allow themselves a little latitude when they break out into "Cherub," "Nightie," but "Reek" has an unpleasant connotation outside of Scotland. *The Drapers' Organiser* has in the main followed the English tradition. Out of the eighty-eight shades already issued all but six are expressed by English words, or words in general use in the language. A serious attempt has been made in the majority to describe colours, as in "Cedarwood," "Sahara," "Blush-Rose," "Parakeet," "Afterglow," "Beechnut," "Surf," "Sand," "Lilac Time," "Wild Rose," "Malachite" and "Red Pepper."

The best argument against present methods of colour naming is the outstanding fact that very few of the hundreds of names invented each year are accepted by the trade or the public. In the main the retail distributor prefers, doubtless for excellent reasons, to use the simplest and most familiar names, such as "Lilac,' "Saxe," "Lemon," "Sky," "Old Rose" and "Nigger." There are other objections to the present method, one of the principal of which is lack of co-ordination. Often the same names are given to different colours. In current cards " Sedge " is applied to a brown and a green, " Rose Marie " to a pink and a red, " Pervenche " to a blue and a mauve, " Caramel " to a gold and a brown ; and fancy names like "Argentina " are applied equally to a red and a grey, "Veronese " to a green and a red, and " Ondine " to a blue and a green. Instances could be multiplied. It is not surprising that colours are, at present, preferably ordered by number rather than by name.

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[26] *Evening Standard*, Jan 30th, 1830

The chief instrument of practical knowledge for colour users is the shade card. These fall into various categories, such as standard cards, for the guidance of colours in general use in a given trade ; stock cards which show the number of colours available from stock ; dye-makers' cards, showing new shades or ranges of shades applicable to particular goods ; dyers' and finishers' cards, of seasonal or generally accessible ranges ; and, finally, Colour Forecasts. We are now mainly concerned with the last. But it is worth pointing out in passing that the Standard Colour Card is an important factor in colour determination and differentiation, particularly in the fashion trades, and that although there are standard cards for certain classes of merchandise, such as crêpe de chine, which are of great value, there is no general standard for the fashion trades, nor has any serious attempt yet been made to construct one. This is remarkable when it is considered that as long ago as 1905 the French Society of Chrysanthemum Growers produced an excellent colour index for the use of horticulturists, and at the present moment the British Engineering Standards Association is producing a British standard schedule for the paint trade

The leading forecasts at present in use are those issued by the Chambre Syndicale des Teinturiers of Lyons ; the Fédération de la Soie (composed of the silk manufacturers of Lyons and the ribbon manufacturers of St. Etienne), the Société de Teinture et d'Appret of Basle (late A. Clavel and F. Lindenmeyer), Claude Frères of Paris, the Textile Colour Card Association of the United States, Inc., the Bradford Dyers' Association, Ltd., J. and J. McCallum, Ltd., a branch of the British Cotton and Wool Dyers' Association Ltd., and *The Drapers' Organiser*. In the past there has been little co-ordination of effort or method between the producers of any of them ; but there is a desire in some quarters to encourage the publication of certain leading French colours in the forecasts issued in America, England and Germany. In fact, the producers of colour forecasts in those countries seek such co-operation. The French, American, and Swiss cards are in the nature of generalisations of a number of shades showing an average tendency with no specific guidance. Many of the shades never become a vogue, at all events in this country. The Bradford and Scottish cards play in the main for safety by giving chiefly non-speculative colours. *The Drapers' Organiser* card is a pioneer of concentration. The object of this card is to create a seasonal spectrum which focusses the main colour tendency in not more than ten colours. The shades are generally included in the forecasts of the Bradford Dyers' Association and the British Cotton and Wool Dyers' Association, and they are also issued separately by a number of manufacturers of dyestuffs. In addition to the general forecast of the Textile Colour Card Association of the United States, specialised cards covering the wool, hosiery, leather, and other trades are issued, and members are supplied with topical colour information from time to time. Forecasts for the leather industry are also issued in France and Germany.

It is obvious that the production of a colour forecast demands a considerable amount of knowledge, and there is no doubt that expert opinion is mobilised for their production. It is equally certain that present colour determination is based almost entirely upon French opinion. Decisions in the first place would appear to be obtained by consultation between the silk and woollen manufacturers, dyers and dressmakers. It should, however, be remembered that the Syndicate cards are nothing more than a generalisation of tendency and it is certain that although the couturiers of Paris are consulted they reserve to themselves the right to introduce at will novelty shades which may force re-adjustments during the season. At the same time, the generalised forecasts are indispensable instruments of the fashion trades, and the bulk colour tendencies of every season are drawn from them.

The object of colour prediction is to provide the fashion trades with information sufficiently in advance of a season for them to prepare for demand. The problem of achieving this end is a question of acceptance rather than selection, although the two are closely related. Any individual or group of individuals in the fashion trades could select a range of colours for any season, which would be approximately correct. The method is fairly simple, although it requires judgment and experience. In the first place, colours are to some considerable extent derivative from the preceding season. For instance, dark shades of the autumn have a habit of reappearing in light tones for the spring, and vice versa. On the other hand, colour fashions often run in groups. To use a musical term, a certain chord is struck, say in red, and the constituents of that chord may be popular for several seasons. Negative reaction has also to be taken into account before the introduction of novelty as distinct from new shades can be made. The need of change for its own sake and in the interests of business is an important factor. Finally, every shade card contains novelties which are entirely speculative, and sometimes it is the speculative or risky shade which becomes the catch of the season.

The real trouble begins, however, with the propagation of these colours. Here powerful interests have to be considered before the consumer is approached. Leadership is essential and, once the implications of leadership are understood, colour forecasting is removed from the sphere of prophesy. Fashion colours are determined, not predicted. Every wise colourist has taken to heart Mark Twain's dictum : " Never prophesy unless you know." The battle of fashion colours is thus very largely a matter of propaganda, and the best propagandist wins. Designers, manufacturers of materials, makers-up and distributors have all to be converted before the consumer is approached. But even here discrimination must be used.

It is extraordinarily difficult to make a colour fashionable without the willing co-operation of the creators of fabrics and gowns, and even then the victory is not complete, the distributor and the consumer have still to be won over.

It is here that the propagandist comes in, and his work is so subtle that the most experienced buyers are influenced without knowing it. I do not suggest that the buyers are deceived, they are simply manœuvred into a position favourable to the interests behind the propaganda. Independence of choice is not eliminated, but the range is canalised by organised suggestion which is addressed beyond the buyer to the consumer, so that by the time fashion goods reach the shops women have already the beginnings of a point of view upon the coming shades, silhouettes, and other fashion details.

There is a delicate balance between fashion news and propaganda. It is not easy to say where one begins and the other ends, and the difficulty is increased because, although things are not what they seem, they are far from being illusions or even misleading. French fashion propaganda is news, but it is inspired news. It is the method adopted by the manufacturers and dressmakers of France to influence opinion in favour of their own goods, and it has the double effect of creating goodwill for the French fashion trade as well as supplying information relating to the movements of that trade.

Propaganda, however, is by no means confined to the Press. Every avenue of influence is explored and used. The theatre and the race-course, fashionable pleasure resorts and hotels are all made to serve this industry. The couturiers of Paris have almost succeeded in turning such social events as the season at Deauville and on the Riviera into dress parades, in which madam is often only distinguishable from mannequin by certain subtle differences in the technique of wearing clothes. Fashions are here in the making, and it is here that the raw materials of the fashion writer are found. A new colour is reported at Longchamps or Deauville, a new ensemble at Monte Carlo, a new line at Juan-les-Pins. The reports are true. These phenomena have been seen and can be verified. But their appearance has been staged by the fashion houses, whose lay figures thus startle women into a new mode, and the news is flashed round the world and gradually filters through the pages of the Press until fashion thought is universally permeated with the French idea.

In addition to this careful staging of fashion interests in the meeting places of well-dressed people, provisional propagandists are engaged in the work of press permeation. This is a highly skilled and well-paid branch of journalism. One propagandist in Paris informs me that it is not unusual for him to send to American papers no less than two thousand copies of an inspired article, one thousand words long, every month. These articles are offered free of charge to editors, with satisfactory results. The goodwill of the French fashion trade is thus maintained and extended throughout the American Press. It is, indeed, difficult to open any United States newspaper without discovering enthusiastic articles about French fashions, which are little more than unpaid advertisements.

It should not be forgotten, however, that such propaganda would be impossible unless it had the sort of information which the readers of those papers demand, and unless the styles thus propagated were accessible to the consumer.

It must be admitted that there is a genius for creative fashion work in France, which has been developed by tradition and circumstances. But although this art is centred at the moment in Paris, it is not necessarily a gift of which the French alone have the secret. The artists of the French fashion trade are drawn from many nationalities, and among them are English designers of such distinction that they have sufficient power to initiate both colour and style tendencies. What the French have done is to have provided an atmosphere in which such genius and such an industry can thrive.

I believe that there are no insuperable difficulties to the establishment of a creative fashion trade of our own. I am, of course, aware that one Molyneux does not make a summer, but he is no longer alone, and we have already taken steps to improve our status. The movement towards co-operation between manufacturers of fabrics and costume designers is growing and British skill has found definite expression in popular fashions.

Design in British fabrics has reached a high state of excellence, in high-grade woollens, cottons, and most of all in artificial silk. There are instances of British fabrics being bought in Paris by visitors who could have bought them cheaper in England ; and French silk manufacturers are watching our rapid progress in artificial silk design with concern. This new industry provides opportunities second only to the discovery of synthetic dyes, and Britain leads the world in quality of yarn, variety and excellence of weaves and finishes and beauty of design.

The formation of the British Colour Council is thus significant, and an essential step in the right direction. It has been taken because our colour users have realised that unless they have reliable means of providing themselves with correct colour information at the right time they can never make the progress of which they are capable. The work which the Council has to do is of national importance. It will involve the creation not only of an expert bureau of colour knowledge, but the formation of constructive liaisons with all branches of the trades concerned, and with all colour producing countries. The creation of an international bureau for the exchange of colour information as it affects the bulk trades might not be the least important of its functions. There is no reason to doubt its success, because the aim is not to interfere with the freedom of action of individual firms, but to add to their power by providing them with timely and reliable colour information.

I will not go so far as to suggest that any form of organisation of colour interests could remove all the anxieties of so speculative an industry as fashion. Novelty businesses must live dangerously. But the risks can be reduced and localised by co-operation. To a considerable extent the creators of exclusive fashions must bear their own burdens. That is a condition of all creative work, but this branch of the industry is small. Organised colour determination is not primarily for them. The bulk of colour research at present is directed towards anticipating what these exclusive houses are going to do. A creative fashion centre is a hotbed of espionage. There are assembled the fashion spies of all nations seeking, by methods comparable to those of the military intelligence officer, to discover trade secrets. These secrets are jealously guarded and so conscious are the Parisian merchants of the value of originality that copying designs shown in the shop-windows of Paris has been made illegal. A considerable trade has come into existence for the purpose of supplying advance fashion information, and colour users are dependent, either directly or indirectly, upon information thus supplied.

Individual research will continue, but some of it could be conducted co-operatively with advantage, particularly that which serves the needs of the popular fashion trade. At the present moment our manufacturers and distributors have in the main to scrounge for information, or wait patiently till it is given them by the French Syndicates. This is inconvenient and dangerous, for although it is uncertain whether there is any organised effort to place colour information in the hands of French manufacturers and distributors before it is internationally released, there is little doubt that information leaks out, and no doubt that the exclusive fashion houses, some of the woollen houses, and probably all of the silk and ribbon manufacturers of France are in the position to obtain advance information which places them beyond the range of foreign competition. Nobody can blame them for this astute piece of strategy, nor will blame be accorded to those merchants and manufacturers who pay them that compliment which is called the sincerest form of flattery.

DISCUSSION.

THE CHAIRMAN said the subject was one which many felt was a mysterious, difficult and perplexing one, and it had been illuminated by Mr. Jackson in a most entertaining, lively, fascinating and penetrating way.

He wondered whether the concrete proposal to try to take a hand in the determination of the range of colour which should be worn from year to year would prove a blessing or a curse to those who had the æsthetic feeling. The lecturer had referred to many historical instances of control of the use of colour in garments at various times and in various countries, and that very morning he had had an opportunity of discussing the matter with Mr. Walter Sickert. Mr. Sickert, while regretting the dying out of local fashion, the fashions of districts and of various countries, took the view that anything which brought about order and harmony, and some relationship in the colours worn, must be an advantage from an æsthetic point of view, and this might be done by the co-ordination outlined by the lecturer. One of the great achievements in recent theatrical productions and in the best cinema performances, had been the massing of the effects in such a way as to get some sort of relationship and form and meaning into the presentation of a piece. It must be an advantage to those who wanted to dress or furnish their houses with discretion to be able to get from one shop the things they required, without having to hunt for bits all over a town, and then to find that they could not get anything which gave them a really pleasing and harmonious relationship.

Professor Aldred Barker (Professor of Textile Industries, University of Leeds) said that no one, unless he had had to do with the use of colour, could appreciate the true value of the lecture. For example, there had been almost a surfeit of names for colours, and it might almost be thought that the lecturer had carried that side of the subject too far ; but that was not so, because many of the names he had referred to did conjure up colour visions which tended to make colour designers true colour designers instead of users of colour without inspiration. He had always tried to impress upon his students at Bradford that the colours in their colour boxes were not colours, but pigments, and that the students had to make colours from them ; and he used to instance what he really meant by colour by referring to colours in Nature. Two that he used to give were the primrose and the cowslip—a green yellow and an orange yellow—colours which carried the mind in the right direction towards the subtlety of colour. He had impressed this point on one man to such an extent that in his examination paper he had referred to "some types of red, for instance, cow red !"

In the designing of colour styles, designers must have good ranges of colours to begin with, and then those colours must be graded. When he was a young man the idea of the beautiful gradation of colours had absolutely created a revolution. Some people would say that as soon as organisation came in colour went out. He thought that was not so. Organisation of colour could be used in a way which helped rather than hindered, and it might help not only artistically but economically. He had once trained a man to design for the Huddersfield trade, who, working with very strict organisation of colour, had faced the best Huddersfield competition in men's wear with about sixty colours as against nearly six hundred ; so that what the lecturer was pleading for had an economic as well as an artistic value, and the economic value did not exclude the artistic value.

He had had the privilege two or three years ago of speaking at the Clothworkers' Hall on the way colour sequences ran. He remembered going into the mill about 1886, and the first range of patterns he had made were greens, and when these were thrown on the table before the travellers they had all started laughing : they said it was impossible to sell green outside Ireland. That was a fact at the time ; it was the brown period ; but in less than ten years the green period had been reached. One could follow out a sequence of colour. There was something in the idea that we do naturally follow the sequence to which the lecturer had referred—the solar spectrum. It ran into a period of about eleven years up to the red, and then down again to the violet. This was well shown in the war period. He remembered Mr. Hitchcock, who had command of the wool manufacturers, anxiously inquiring what was going to happen after the war. He (the speaker) had replied that two things were quite obvious : first, that the men coming home from the front were going into blue ; having been in yellow khaki for so long, they would throw over to the complementary ; and the women having already been thrown on to the blue would want something else, they would throw off from dirty khaki on to clean blacks and whites ; and sure enough both these things happened. He thought English designers might even get ahead of what the French people were going to put before them by following the colour sequence. A typical example had lately occurred, when one of the outposts had reported that the colour fashions would be yellow greens. The Bradford people would not believe it, and unfortunately missed an opportunity. That was the very range of colours that should have come up under the spectrum chart.

The lecturer was right in saying that it was essential to create the right atmosphere ; but it was most difficult to do that with British designers. They had been so long accustomed to a poor, uninspiring atmosphere that it took some time even to respond to a good atmosphere. At his own university of Leeds they had one of the finest collections of patterns, beautifully displayed, owing to the munificence of the Clothworkers' Company, that was slowly permeating British design. The university had sent out three or four designers to the very best firms, such as Warner's, Morton's, Crossley's, and so on ; but to-day he had the greatest difficulty in inducing the local people to take the inspiration. About a month ago there had arisen the question of the Italian productions of cloths for motor-car linings. These were very good, but as a matter of fact we could do better, but our people would not go to the experts who were there waiting for them. If the lecturer's propaganda would stimulate British manufacturers to take advantage of their opportunities, much better results would be produced.

When he had first heard about the Colour Council scheme he confessed he was very sceptical about it, and not at all enthusiastic ; but the lecturer had converted him.

MRS. FRANCES LOVIBOND (Tintometer Company) said the lecture once more brought forward the necessity of collecting, tabulating and measuring, in some well-known colour unit, the existing colour names. It was necessary to have international co-operation to make such a scheme a complete success, but meanwhile it would greatly help the scheme if every trade started to collect and standardise the colour names which they were already using in their trades.

Sir Isaac Newton's seven colours composing white light were proved by the late Mr. Joseph W. Lovibond, who had so often given lectures at the Society of Arts, to be only six, and from those six rays he had established his well-known tintometrical scale, by means of which no less than 65,000,000 colours, ranging from the very smallest tint that the human eye could detect in any colour up to a dense black, could be matched and registered in figures.

MR. W. G. RAFFÉ thought a most important point had just been mentioned by Mrs. Lovibond, and he hoped the lecturer would use his influence in trying to get the British Colour Council to take up the question of effecting a legal standard for colours throughout the British Empire. It could be done, necessarily on an arbitrary basis, but with scientific bases in chemical solutions which anybody could prepare according to recipe. This would enable people in England to communicate with buyers in Australia by cable instead of by post, thereby saving several weeks' time. Speed meant everything in selling fashion goods. If a general agreement could be arrived at within the Empire, and given legislative force by an Order in Council (an Act would not be necessary), it would soon be adopted by the rest of the world, like the metric system.

The lecturer had raised many interesting points about colour fashion. He remembered reading in his early days a number of novels of Stanley Weyman with chromatic titles, and titles such as " The Red Peril," " The Green Eye of the Yellow God," and other terrors that walked by night and haunted us by day were examples of the same tendency. Some colour fashions laid down in mediæval heraldry and by ecclesiastical authority and by sumptuary and ritual laws had not changed for centuries. The purple of the Pope and the red of the Cardinals had been standardised longer even than the scarlet of the British Army. He was sure that fashion would not persuade the men of this country to go into khaki for a costume for the next ten or twenty years. In Germany field-blue was equally unpopular. Another interesting fact was that a fashion could be wiped out by a notorious incident. He might instance the arrangements for Mrs. Maybrick's execution, when she chose to wear black satin. Black satin was absolutely unpopular for some years after that, and he did not know that it had recovered even now.

He did not think that some of the popular name shades would "catch on" for a very simple reason; it would tax even the most sophisticated modern young lady to go into a shop and ask a blushing draper's assistant for a pair of "Kiss Me Darling" stockings. Nor would he like to go into a shop for two yards of "Nightie Blue." Some of these names were undiplomatic, to say the least.

It was absolutely necessary that those who dealt in colour should have themselves tested for colour blindness. He had tested a number of people himself, and found three or four per cent. who had very definite defects in colour vision. He would strongly urge drapery firms, decorating firms and others who employed people to handle colour, to get them tested by Dr. Edridge Green's apparatus, which was a very reliable method, to make sure that mistakes were not made.

Mr. G. K. Menzies (Secretary, Royal Society of Arts) said that although, as the lecturer had pointed out, there were many British designers of great distinction, it was most deplorable that many of them had to go to Paris before they were recognised as great designers. He wished to point out what the Society of Arts was doing to improve the status of designers in this country, and also to encourage them to improve their art. Sir Frank Warner, whose recent death was deplored throughout the whole textile industry, was a member of the Council of the Society, and was deeply concerned about the case of British designers, who had no recognised means of showing their work, but had to hawk it round, and often got very shabby treatment and had to accept miserable pittances for their work. Sir Frank had conceived the idea of holding an annual exhibition of industrial designs, and had persuaded a number of important manufacturers to offer substantial prizes, and these were put up to competition in which any young designer might enter. That competition was run by the Society of Arts. The Seventh annual competition was about to be held. At the previous year's competition a number of manufacturers had paid visits, and two very important ones had told him that although they had just come back from Paris and had seen all the best work that was to be seen there, they saw better work at the exhibition of the Royal Society of Arts than any in Paris. That showed what could be done by us.

Two years ago a big Manchester firm had offered a travelling scholarship for a textile designer. This was won by a very able girl, who went abroad, and she employed her time so well during the six months or so that she was travelling abroad that when she returned the firm had given her a very good permanent post, and last year she had designed for them a material which turned out to be their best seller.

He would much like all those who were interested in improving the design side of textile industries to do what they could to help the Society. The Calico Printers' Association, of which the Chairman was a director, had offered two prizes for this year, and he wished to thank him for his support.

Professor H. E. Armstrong, F.R.S., said there was no more appropriate place than the classic platform of the Royal Society of Arts from which to raise a problem of such importance as the use of colour, bearing in mind that all the great men concerned with the production of dyestuffs had been heard in that room, commencing with Perkin on several occasions, Hofmann and Meldola. He might mention others, ending with Mr. Morton, who had given a most moving lecture on the subject only a few months ago. He had known Perkin within a dozen years of his invention, at a time when not more than about half-a-dozen synthetic colours were on the market.

The lecturer had spoken of England as suffering from an attack of colour blindness in early days, which had prevented the extension of the industry. England had never suffered from colour blindness ; what it had suffered from most seriously was commercial blindness. The men who might have made colours were not sufficiently imbued with the scientific sense to undertake the manufacture of colour successfully. Directly after the war the industry was put in a fair commercial way; it then became a success here and had been a success up to the present moment but would not long remain a success, here or anywhere else, unless the women reformed and used colour more freely. Mr. Holbrook Jackson had spoken of the movement as being always from the static to the dynamic. That phrase sounded well but he did not know what it meant. His own impression was that change had been from the dynamic to the static. In Spain, where he had travelled recently, the concourse at a Sunday afternoon bull-fight had borne the appearance of a Wembley football crowd. The women no longer wore colour but were everywhere in black, except a few out in the fields in conventional coloured stockings ; the same state of affairs obtained in Italy; in fact, everywhere except in ball-rooms. To-day it was scarcely worth while to travel ! People all looked alike : the girls had cheeks and lips alike, were without hair alike, they all wore the same dull, inconspicuous dress. The same advertisements were to be found everywhere, the same petrol pumps. One might be fortunate enough to see a little unchanged country here and there ; even this was becoming difficult. People did not realise the extent to which conventions were carried. He supposed the tendency towards sameness everywhere was due to the fact that whereas formerly people wore clothes of native manufacture and had local fashions, they now all followed fashion papers and dressed alike. The women must take themselves in hand and not follow one another so slavishly.

Mr. Jackson had not referred to the important relationship between texture and colour. Almost any colour could be put upon silk and most colours could be put upon cotton but the range of colour that woollen fabrics would bear, taking pattern into account, was very limited.

Men, too, were in fault. When his friends in the dyestuff industry complained to him that business was bad, he replied that it was their own fault. They made colours but did nothing to advertise them ; not one of them wore a coloured garment except perhaps a tie. One only saw men in colour occasionally—in golfing costume or perhaps wearing a coloured scarf. When giving the opening address (at Barcelona recently) at a conference of French and Spanish chemists, he had taken as his subject " Molecular Structure, Life and Colour." The inspiration came upon him to have a coloured waistcoat made for the occasion. When speaking of jade green, he suddenly opened his coat and displayed his waistcoat of the colour : this absolutely brought down the house During the rest of the meeting the ladies hung round his neck in worship of that green. Had he spent the winter in Paris and attended the entertainments in that *gilet*, he felt sure that he might have led the Professors' wives to force their husbands all to wear coloured waistcoats. He was rather old to become a Beau Brummel but the effect upon the French ladies in his experience had been so magical that he felt tempted.

His main point was, that the women must be brought to order : taught to respect and understand colour and make full and proper use of it.

Mr. Holbrook Jackson, in reply, thanked those who had contributed so ably and so humorously to the discussion. He had listened to Professor Armstrong with the same profound and amazed interest as all the audience had done, and whilst listening to him he was thanking his lucky star which had prevented him from displaying his small store of chemical knowledge. He did not know that so eminent and distinguished a chemist as Professor Armstrong was present, and it was just chance that had prevented him from falling into Professor Armstrong's grip

At the same time, he thought Professor Armstrong had fallen into his own clutches He had committed an indiscretion in quoting from the printed form of his speech, half of which he had omitted , and he had torn his beautiful metaphor about colour blindness from its context and made it look absurd, as only a skilled debater could He had also taken his references to static and dynamic and robbed them of all their "relativity," and made them also look ridiculous , in fact, Professor Armstrong had sacrificed him to make an R S A holiday !

He did not know why black was the predominating colour in Spain The Chairman had whispered to him that it was probably because Spain was a Catholic country That might be the reason It might be that black resisted the sun's rays more than any other negative colour , but it was the fact that black was the predominant colour both in Spain and in Italy

He would give a qualified admission to Professor Armstrong's reference to the uniformity of fashion Fashion was a form of uniform, but it was a uniform which gave opportunity of personal and individual distinction A fashionable woman had to be a genius in these days , she had to work within the limits of the uniformity to reveal her magnificence to those who wished to see it At the same time, he had given sufficient reasons in his paper for the uniformity Fashion ideas were dictated from one centre, therefore they took the complexion of the ideas of that centre , and, as commerce was internationalised nowadays, the ideas of Paris, or of whatever centre dominated fashion, would go right round the world, and to that extent create a uniform , but so necessary to commerce was it that fashion should change that the uniform was constantly changing He knew it was the ambition of all colour users to reduce the number of colours in demand, but up to now they had failed to do it, and Professor Armstrong would be pleased to hear that they had failed to do it because women refused to be limited in their colour needs, and despite what Professor Armstrong had said, many more colours were now in use than ever before If his ideas were carried out, our textile trade would be in even a more parlous condition than it was It was far better to let women go their own way, or let women think they were going their own way along the lines he had indicated, and then everyone would get better dividends from his shares in textile and dyestuff corporations, and more employment would be created That might seem a mercenary way to look at it, and it was mercenary , but it must be realised that modern life was based upon financial valuations, and unless people were employed they did not get sufficient money to live the sort of life they would like to live It was therefore necessary to force fashions to change, to force people to use more varied clothes than they really needed, and to scrap them before they were worn out As long as the present system held, that method would continue, and it would lead, as Professor Armstrong had observed to a considerable amount of uniformity We were not only in danger of uniformity of style , we were in danger of uniformity of mind, through recorded music and broadcast messages and lectures, and all sorts of entertainments like the cinema, which were standardised throughout the world, so that at a given moment practically everybody was thinking the same thoughts What the outcome of that would be he did not know, but he was not frightened or disturbed, because whatever it was, he knew it would be interesting

Mr Menzies had referred to the work done by the Royal Society of Arts in its competitions He had some knowledge of those competitions, and he heartily supported what Mr. Menzies had said. They deserved the support of everybody connected with the textile and colour trades.

He had been interested in Mrs Lovibond's remark He was sorry to hear that the ideas of Newton had received another blow He had thought that Einstein was probably the last blow that would be aimed at Newton, and it was sad to think that his seven colours had been reduced to six He was glad to have confirmation of his own intuition that it would be possible to have a classification of colour on a mathematical basis from the words of Mrs Lovibond He thought the only way to have a standard colour card or colour system would be on a mathematical basis, the colours being numbered instead of named There was no reason why names which had been applied to those particular shades should not be recorded beside their numbers He need not enlarge upon the importance of such a standard from the commercial point of view, for it was incalculable

In conclusion, he desired to say a word about the Chairman Mr Forest Hewit was Chairman of the Joint Standing Committee on Technical Education in the Cotton Industry, and was responsible, with his colleagues of that Committee, for the production of one of the most useful documents to the textile trade which had ever been published It was a complete inquiry into the methods of teaching design in this country, showing how other countries had an advantage over ours, and showing how we could develop and improve our methods of teaching It should be known at such a meeting as that that the Chairman was one of those responsible for the production of this very important report, which was accessible to anybody who wanted to see it

On the motion of the Chairman, a hearty vote of thanks was accorded to the lecturer

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK

◆

SUNDAY MARCH 16 The Guildhouse Eccleston Square S W Beautiful England Campaign 3 30 p m Inaugural Address by Mr Herbert Morrison M P Minister of Transport

MONDAY, MARCH 17 Architects Royal Institute of British 9 Conduit Street W 8 30 p m General Meeting

Automobile Engineers, Institution of at the Royal Technical College Glasgow 7 30 p m Mr H R Ricardo, ' Combustion in Diesel Engines

Electrical Engineers Institution of Savoy Place W C 7 p m Discussion on High Tension Substation Control Gear

At the University Liverpool 7 p m Captain P P Eckersley Broadcasting by Electric Waves (Faraday Lecture)

Geographical Society Lowther Lodge Kensington Gore S W 5 p m Lt Col R C F Schomberg " Climatic Conditions in the Tarim Basin '

Mechanical Engineers, Institution of Storey s Gate S W 7 p m Graduates Section Annual Lecture Mr William Taylor, " Science in Works Management

University of London, at King's College, Strand, W C 4 30 p m Prof E Prestage, " Portuguese Voyages of Discovery and Empire-Building " (Lecture IV) 4.30 p m Rt Rev A C Headlam, " Christian Reunion. Lecture III—The

5 30 p.m Prof. R. W.

British Foreign Policy (1815 80) Lecture IX—Disraeli s Imperialism and the Eastern Question (1874 78)

5 30 p m Rev G R Woodward Carols

At the London School of Economics Houghton Street W C 5 p m Prof E Lederer Social Development in Germany during the last Ten Years " (Lecture I)

Victoria Institute at the Central Hall Westminster S W 4 30 p m The Rev Charles Gardiner How Far do the Apologetics of Bacon Butler and Paley hold good for Present Use ?

TUESDAY MARCH 18 Automobile Engineers Institution of at the Engineering and Scientific Club Wolverhampton 7 30 p m Captain J S Irving The Golden Arrow and the World s Speed Record

East India Association at the Caxton Hall Westminster, S W 4 30 p m Mr C F Strickland What India Really Needs

Electrical Engineers Institution of at the Engineers Club Manchester 7 p m Mr H W Taylor, Voltage Control of Large Alternators

Heating and Ventilating Engineers Institution of, at Milton Hall Manchester 7 p m Paper by Mr W G Atkinson

Metals Institute of at the Chamber of Commerce, Birmingham 7 p m Mr W R Barclay, " Nickel-Chromium Alloys "

At Armstrong College, Newcastle-on-Tyne 7 30 p.m. Annual General Meeting

Philosophical Studies, I

Society of Arts.

Photographic Society, 35 Russell Square, W.C. 6 p.m. Annual General Meeting. 7 p.m. Dipl.-Ing. A. Kossowsky, "Modern Methods of Sound Reproduction in Kinematography."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr Charles Singer, "Science of the Renaissance."

Statistical Society, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 5.15 p.m. Mr. M. S Birkett, "The Iron and Steel Industries since the War."

Television Society, at University College, Gower Street. W.C. 6 p.m. Annual General Meeting. 6.30 p.m. Prof. Sir Ambrose Fleming, Presidential Address, "The Relation of Governments to Invention."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.45 p.m. Mr. Nugent M. Clougher, "The Hudson Bay Railway."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof Sir B. Pares, "Russian History from Peter the Great to 1861. Lecture IX The Emancipation of the Serfs."

Zoological Society, Regents Park, N.W. 5.30 p.m. Scientific Business Meeting.

WEDNESDAY, MARCH 19..Automobile Engineers, Institution of, at the Metropole Hotel, Leeds. 7.15 p.m. Mr. W. Lewis Morgan, "Organisation of Public-Service Motor Vehicle Repair and Maintenance Systems."

Electrical Engineers, Institution of, at the Mappin Hall, University of Sheffield. 7.45 p.m. Captain P P Eckersley, "Broadcasting by Electric Waves." (Faraday Lecture.)

Literature, Royal Society of, 2 Bloomsbury Square, W.C. 5 p.m. Ordinary Meeting.

Meteorological Society, 49 Cromwell Road, S.W. 7.30 p.m Dr Herbert Lapworth, "Meteorology and Water Supply." (The G. J. Symons' Memorial Lecture.)

Microscopical Society, 20 Hanover Square, W. 8 p.m Mr Joseph E. Barnard, F.R.S., Presidential Address, "Resolution and Visibility in Medical Microscopy."

Overhead Lines Association, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.30 p.m. Dr. Alfred Ekstrom, "Overhead or Underground Cables for Transmission Lines."

United Service Institution, Whitehall, S.W. 3 p.m. Major F. A. Freeth, D.Sc., F.R.S., "The Chemistry of War."

University of London, at King's College, Strand, W.C. 5.30 p.m. Prof J. Maritain, "Science et Philosophie D'après les Principes du Réalisme Critique."

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. E Lederer, "Social Development in Germany during the last Ten Years." (Lecture II.)

6 p.m. Dr G. H. Miles, "The Problem of Incentives in Industry." (Lecture III.)

6 p.m. Mr. R. E. Simpson, "Office Machinery. Lecture VIII—Form Planning."

At University College, Gower Street, W.C. 5.30 p.m. Mr. A. M. Wijk, "Three Swedish Poets." (Lecture III.)

THURSDAY, MARCH 20..Chemical Society, Burlington House, W. 8 p.m. (1) Mr. C. K. Ingold, "The Mechanism of and Constitutional Factors Controlling the Hydrolysis of Carboxylic Esters. Part I--The Constitutional Significance of Hydrolytic Stability Maxima. (2) (Miss) C. M. Groocock, C. K. Ingold and A. Jackson, "The Mechanism of and Constitutional Factors Controlling the Hydrolysis of Carboxylic Esters. Part II -Hydrolytic Stability Maxima of some Glyceric Esters."

Chadwick Public Lecture, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 8 p.m. Dr. Margaret Fishenden, "The Outlook for Smokeless Heating."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Dr. B. Leggett, "Medical and Surgical Applications of Electricity."

At Trinity College, Dublin. 7.45 p.m. Mr. W. J. Girvan, "The Practical Application of the Principles Underlying the Equitable and Profitable Sale of Electrical Energy."

At University College, Southampton. 7.30 p.m.

Linnean Society, Burlington House, W. 5 p.m.

L.C.C. Geffrye Museum, Kingsland Road, E. 7.30 p.m. Mr. D. Martin Roberts, "London in the Middle Ages."

Mechanical Engineers, Institution of, at the Midland Hotel, Birmingham. 6.30 p.m. Prof. Dr. W. E. S. Turner, "Machinery and Methods of Manufacture of Sheet Glass."

Mining and Metallurgy, Institution of, at Burlington House, W. 5 p.m.

Petroleum Technologists, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 5.30 p.m. Annual General Meeting.

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Mr. J. B. S. Haldane, "Some Problems of Genetics."

University of London, at the Imperial College of Science (Botany Lecture Theatre), Prince Consort Road, S.W. 5.30 p.m Dr. W. F. Bewley, "Diseases of Glass-house Plants." (Lecture III.)

At King's College, Strand, W.C. 5.30 p.m. Mr. H. W. Steed, "Masaryk and Central Europe. Lecture IV-- Principles of Democratic Statecraft."

At the London School of Economics, Houghton Street, W.C. 5 p.m. Prof. E. Lederer, "Social Development in Germany during the last Ten Years." (Lecture III.)

FRIDAY, MARCH 21..Electrical Development Association, British, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 7.30 p.m. Paper on "Sales Policy and Practice in Connection with Electricity Supply Undertakings."

Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Mr. M V. Hurst, "Surface Combustion." Informal Meeting.

London Society at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 5 p.m. Dr. Raymond Unwin, "The Decentralisation of Industry."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Prof. Dr. W. E. S. Turner, "Machinery and Methods of Manufacture of Sheet Glass."

North-East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-upon-Tyne. 6 p.m. Sir Westcott Abell, "Direct Flooding Calculations."

Photographic Society, 35 Russell Square, W.C. 7 p.m. Informal Meeting of Pictorial Group.

Royal Institution, 21 Albemarle Street, W. 9 p.m. Mr. Seton Gordon, "Sea Birds and Seals."

University of London, at King's College, Strand, W.C. 5.30 p.m. The Rt. Hon. Sir D. P. Barton, Bt., "The Literary Background of the Inns of Court in the time of Elizabeth and James I."

At University College, Gower Street, W.C. 5 p.m. Mr. G. P. Wells, "Comparative Physiology." (Lecture X.)

SATURDAY, MARCH 22..L.C.C. Horniman Museum, Forest Hill, S.E. Mr. Montagu A. Phillips, "Pond Life."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Sir Ernest Rutherford, "Atomic Nuclei and their Structure." (Lecture III.)

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JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4035 *FRIDAY, MARCH 21st, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> *People are always thinking of education as a means of livelihood. Education is not a profitable business but a costly one; even the best attainments of it are always unprofitable in any terms of coin No nation ever made its bread either by its great arts or by its great wisdoms. By its minor arts or manufactures, by its practical knowledges, yes. But its noble scholarship, its noble philosophy, and its noble art are always to be bought as a treasure, not sold for a livelihood. You do not learn that you may live, you live that you may learn.*
>
> *Ruskin*

A Royal Society of England.—We hope to return to the subject dealt with at length in the last issue of the *Journal* when the Sub-Committee appointed to report on the innumerable societies in England has made its report.

English Hotels and Inns.—Following that lively article in "*Good Housekeeping*," the *Daily Mail* is publishing reports from a correspondent on the subject. "It is hoped that our correspondent will enable hotel-keepers to put their houses in order before the tourist season begins." No "Come to England" effort will avail much unless in all places of interest good inns, where hospitality such as was once characteristic of the inn, is once more available.

The *Daily Mail* with its enormous circulation is doing a real service to the country in calling attention to the general disregard on the part of the inn and hotel keeper of the welfare of the traveller.

Poole.—Instead of rejoicing over the failure to spoil their harbour by the proposed unsightly bridge, this ancient town is bemoaning that it cannot compete with Bournemouth.

In a recent speech, Alderman H. S. Carter, a former Mayor, said: "Poole seems to have missed the spotlight, and even to-day there are people who ought to know better, who merge the town of Poole in their imagination with that of its larger neighbour. All this will have to be corrected."

A hint that the ooze in the harbour might be medicinal mud filled Poole residents with hopes that the creeping tentacles of the octopus might be stayed. Mud baths, if established, would give the resort a distinction that would stamp it unmistakably as an independent entity. The tale of the curative mud would be broadcast over the habitable globe, making the glamour of municipal orchestras, pine walks, piers, and promenades something less than the glow-worm's ineffectual fire. From all over the world wealthy valetudinarians would come to wallow in the mud.

Thus was the trouble of the big ships that pass with their treasure-filled holds momentarily forgotten. What matter that the mud filled the harbour bed so long as it were golden mud? The Corporation hastened to send a sample of it to the experts of the National Physical Laboratory for analysis, and in one merciless sentence the scientists of that institution have crushed Poole's hopes for ever. Their report on the mud states that "for all practical purposes it might be regarded as non-radio-active."

So, for a while at all events, Bournemouth's golden sands will glisten undimmed.

Poole still has a character and atmosphere that modern Bournemouth might well envy, but judging by its modern development and its general untidiness it does not realise this. What about a Civic Society to guard its remaining character and use all the existing powers to clear away its unsightly advertisements and generally tidy up the town? It surely is a much more characteristic Dorsetshire town than Bournemouth.

Books.—"PENDING HEAVEN," BY WILLIAM GERHARDI.—It is difficult to place Mr. Gerhardi; sometimes he is trivial, sometimes frankly satiric and humorous, and often he strikes a strange depth which is very disconcerting in the midst of the former moods. "Pending Heaven," his latest book, deals, as usual, with modern cum artistic society, but he seems to have lost some of his exuberance, and what we forgave in his whirlwind methods we find hard to forgive when he becomes more analytical. But he has a light touch, quick observation and an excellent gift of satire, though somehow the foundations are weak. Max and his villa at Toulon and his ineffective amours are amusing for a while, while Helen is an excellent bit of characterisation.

Advertising Kiosks.—Among all the controversy and criticism going on lately on the subject of advertising and its effect on the beauties both of our towns and villages, we think a word might be said for the very simple foreign system, which does not even seem to have been tried in England, that of advertising kiosks. Not only does it obviate ugly hoardings and the pasting up of unsightly bills, but all the advertisements being together in one place is really an advantage to the advertiser, as people who look at one advertisement generally cannot fail to see all of them. We happen to remember them in Germany particularly—they are not systematically used in France—and there they stand rather apart, usually on a large island and there is nearly always a clock and frequently underneath papers are sold, so that it becomes a little centre in the street and is both useful to the public and the advertiser. Surely this is a solution. Soon the disease of advertising will make our towns impossible. This seems to be the only possible way out.

The Films—The Italian Straw Hat.—Probably the fact that the Avenue Pavilion, Shaftesbury Avenue, is shortly to be wired for the talkies means very little to the average person, but to anyone who is really interested in the Art of the Film, which we are rather losing sight of in the welter of production lately, it is nothing short of a tragedy. For this little theatre had a policy of showing interesting films when they could, not, let us hastily add, highbrow tragedy, but impressionist films, German and Russian, charming comedies and fantasies; in fact, very much like a more public film society. It was known to few, but those who saw " The Marriage of the Bear," " Warning Shadows," and " Cinderella " there will never forget them. These were three films with which one could find no fault; they were perfection. Shaw and Barrie both said, I believe, that " Warning Shadows " was the most wonderful film they had seen and now we have the " Italian Straw Hat." Would that I could say it is English, but it is a delightful roaring French farce, so exquisitely produced, that even while our sides ache with laughter we are admiring the subtlety and the amazing sense of drama shown by René Claire, the producer. No one who wants a good laugh and at the same time an exquisite film, should miss this—it is a joy.

Mr. C. B. Cochran's Review of Revues.—This is an entertaining volume with a misleading title. It has very little to do with " Reviews," or " Revues," but is none the less amusing for that. It chiefly concerns the letters of various famous folk telling Mr. Cochran what they would do with the theatre if they had a free hand, a full purse. Some treat it seriously, some fantastically, but all entertainingly. Mr. Joseph Thorp gives a witty and delightful reply, Mr. Agate a provocative one ; no one seems very hopeful as to the future of the theatre. Among the other items is an amusing theatrical dictionary by Mr. Ronald Jeans, and an exceedingly interesting and well written account of the " Army of Journey's End," written by Mr. Robert Speaight, one of the original cast, who gives a brilliant performance of the would-be deserter. It is a very stimulating little book and some of the illustrations are decorative.

Art.—The work of Austin Frederick at the Twenty One Gallery, is curiously disappointing. We keep on hoping that we shall come to something really first class, and somehow it just misses every time. Some of the most beautiful work is rather too reminiscent. Though the "Washing of the Feet of Christ," and the "Street Mission," are good, they somehow lack vitality. The finest original work seemed to be the architectural drawings, more especially the pen and chalk drawing "Church of St. Pietro, Assisi," which was quite delightful both in its exquisite detail and general effect, and stood out as much more spontaneous than the rest of the exhibition.

The Exhibition of the Advertising Club is large and very uneven in character, while some of the work is quite incredibly bad, a few exhibits show great talent and aptitude for design, but alas, it is only the few. Advertising generally is in such a critical state at the moment that it is particularly interesting to see which way design and illustration are moving. Among some of the more vigorous and original artists we might mention Yvonne Gough—though her work is uneven—Lionel R. Allston and J. Beever; and many others are on quite a high level. The rest of the three hundred odd exhibits are on a general level of mediocrity. Surely it is time for a real Advertising Art Exhibition, using some of the best from this Club and inviting others to send and compete. Advertising plays a tremendous part now, not only in commerce but in the decoration (or the reverse) of our tubes, 'buses and streets; in fact, it is a very large factor indeed in national life. Could not this exhibition be used as a nucleus of a much larger and more public collection of new work for this important object ?

The Young Painters' Society.—This is the first exhibition of a new society, which, though it includes the work of a good many well-known people, is primarily chosen from the work of younger lesser-known artists. In spite of the splendid enthusiasm for young art shown by Mr. R. R. Tatlock in an interesting article in the *Daily Telegraph*, we must confess to being very disappointed. There were one or two vigorous and outstanding pictures, of course, and many others with facility and charm, but, on the whole, it was a disappointing show; there were too many misshapen jugs of flowers, tired-looking sardines and woolley nudes. The "Bach Concert," by Mr. John Cooper, is interesting but sketchy, and there are a great many other exhibits painted in this half-finished manner. The sculpture includes many lumpy granite women and shapeless animals, but one or two charming heads do their best to make up for it.

The Countryside.—Mr. Herbert Morrison, the Minister of Transport, opened the "Beautiful England Campaign" at the Eccleston Guildhouse yesterday.' He made an excellent speech about roads and their effect on the beauty of the countryside. "There are acres and acres of urban areas and hundreds and thousands of human dwellings, which, if it were practicable, ought to be blown up in order to get a clean start," he said, but, as it was, they must do their best in the future to preserve the amenities. England at last seems to be waking up to the responsibilities of the preservation of the countryside !

Sir Philip Sassoon's Exhibition of Conversation Pieces.—This is an amazing exhibition set in the lovely spacious house at 24 Park Lane, which seems the perfect background for these quiet pictures of English life. How rich London is at the moment with the Italian art exhibition and now these charming native paintings! It is impossible to describe the atmosphere they give or to pick out any particular one from such a collection—Zoffany, Gainsborough, Hogarth, typical scenes from the English countryside of the 18th century, family portraits and groups, leisurely picnics by lakes, and lovely ladies in taffetas looking through telescopes, or playing with their impossibly well-behaved offspring. Perhaps some of the Zoffanys are particularly good or the subjects particularly suited to his style, but this is a case where comparisons are utterly impossible. We will leave it to those who can spare the time to visit this collection; they will not regret it any more than they regret a visit to Burlington House. We must also make a mention of the masses of hyacinths decorating the hall, which are quite a sight in themselves, and seem to waft one up the staircase to the gallery.

West Wycombe.—A representative of the Society was at West Wycombe recently, and was told that someone had asked why so much was apparently being spent on the Guest House and so little had been done with the cottages, which so imperatively needed attention. Of course, the Society attach the first importance to the work of making the cottages thoroughly habitable and pleasant. They cannot, however, start these with any thoroughness until the drains have been laid, and they are still waiting for plans from the Local Authorities and to hear definitely when they propose starting. They will then start on the first block of cottages in the village, and do these up thoroughly. The Society is not being idle meantime, as they have now come to a satisfactory arrangement with Mr. Abbott of the Chair factory, on the understanding that the plans for the remodelling of his factory are approved by the Society. They are negotiating with Messrs. Ashby's of Staines, who have a two years lease of the hotel and two inns, and hope to report the result of these negotiations very shortly. Meantime, the completed Guest House will, it is felt, be worth the expenditure thereon by reason of the interest it will give to the work of the Society here and in other parts of the country.

High Wycombe.—The Society's attention has been drawn to a proposal to widen Crendon Street. This proposal involves the demolition of a pleasant house known as Dial House. It is presumable that the widening is a better approach to the Station, and on to the Amersham Road, but it would seem as if the widening can only be carried out for a certain length, and does not seem to justify the destruction of a pleasant corner, especially as on the other corner there is a shop and house which does no credit to the town. Has the Council's proposed widening round the Church been abandoned? Why do they not face the continual and growing congestion through the town, and link up the by-pass road, which has been started, through the meadows before you enter the town? The idea that to by-pass the town would be detrimental to trade is, we believe, incorrect. Congestion is caused by the town being on the highway to so many places, but cars do not stop to shop unless they come with set purpose to the town. Indeed, a town where the through traffic is so considerable is more likely to be avoided for shopping by outsiders. The Society would like to plead very seriously for the reconsideration of the widening of Crendon Street.

NOTICES

NEXT WEEK

MONDAY, MARCH 24th, at 8 p.m. (THOMAS GRAY LECTURE). COMMANDER F. G. COOPER, R.D., R.N.R., "Aids to Navigation." (Lecture I).

TUESDAY, MARCH 25th, at 4.30 p.m. (Dominions and Colonies Section). O. J. R. HOWARTH, O.B.E., M.A., Secretary, British Association for the Advancement of Science, "The Work of the British Association in Relation to the Empire." COL. SIR HENRY G. LYONS, D.Sc., F.R.S., Director, Science Museum, South Kensington, will preside.

WEDNESDAY, MARCH 26th, at 8 p.m. (Ordinary Meeting). S. HOWARD ROBERTSON, F.R.I.B.A., Principal of the Architectural Association Schools, "Architecture of To-day and To-morrow." CHARLES MARRIOTT, Hon. A.R.I.B.A., will preside.

COUNCIL

A meeting of the Council was held on March 10th. Present :—Mr. Llewelyn B. Atkinson, M.I.E.E., in the Chair ; Sir Charles H. Armstrong ; Dr. E. F. Armstrong, LL.D., D.Sc., F.R.S. ; Mr. Alfred C. Bossom, F.R.I.B.A. ; Mr. Peter MacIntyre Evans, M.A., LL.D. ; Sir Edward Gait, K.C.S.I., C.I.E. ; Rear-Admiral James de Courcy Hamilton, M.V.O. ; Mr. John S. Highfield, M.Inst.C.E., M.I.E.E. ; Mr. P. Morley Horder, F.S.A. ; Major Sir Humphrey Leggett, R.E., D.S.O. ; Sir Philip Magnus, Bt. ; Sir Reginald A. Mant, K.C.I.E., C.S.I. ; Sir George Marjoribanks, K.C.V.O. ; Sir Henry A. Miers, F.R.S. ; Hon. Sir Charles A. Parsons, O.M., K.C.B., LL.D., D.Sc., F.R.S. ; Sir George Sutton, Bt. ; Mr.

James Swinburne, F.R.S.; Mr. Carmichael Thomas, and Lt.-Col. Sir A. T. Wilson, K.C.I.E., C.S.I., C.M.G., D.S.O., with Mr. G. K. Menzies (Secretary), and Mr. W. Perry (Assistant Secretary).

The death of Mr. Alan A. Campbell Swinton, F.R.S., on February 19th, was reported. On the motion of the Chairman the following resolution was passed :—

> That the Council desire to place on record their deep sense of the loss which they have sustained through the death of Mr. Alan A. Campbell Swinton, F.R.S., who served for many years on the Council of the Society, and for the two periods 1917-19 and 1920-22, filled the office of Chairman. Mr. Campbell Swinton was mainly instrumental in initiating the Fund for Purchasing the Society's House, the object of which was accomplished during his second term of office as Chairman in 1922. For these and other signal services to the Society, Mr. Campbell Swinton was nominated a Vice-President by H.R.H. the Duke of Connaught, President of the Society.

The Secretary was instructed to convey to the relatives of Mr. Campbell Swinton the sincere sympathy of the Council.

Sir Basil Blackett, K.C.B., K.C.S.I., was elected a Vice-President of the Society and a member of the Council.

The following candidates were duly elected Fellows of the Society :

Andrews, Wallace Launcelot, Taunton, Somerset.
Blackett, Sir Basil Phillott, K.C.B., K.C.S.I., London.
Bratney, John Frederick, London.
Cooper, J. Percival, Midhurst, Sussex.
de Ferranti, Vincent Ziani, M.C., Hollinwood, Lancs.
Echterbecker, Professor Charles Frederick, Ph.D., Worcester, Mass., U.S.A.
Fry, Cecil R., Bristol.
Harmsworth, Cecil, London.
Hartness, Mrs. Belle H., Clacton-on-Sea, Essex.
Holden, Rev. John Stuart, D.D., Addlestone, Surrey.
Jackson, Frederick William, Didsbury, nr. Manchester.
Jacobs, Edwin Elmore, M.Sc., Ph.D., Ashland, Ohio, U.S.A.
Mattison, F. C., London
Murray, W. Grant, A.R.C.A., Swansea.
Newbegin, Charles E., London.
Peck, Francis Henry, Hull.
Pooley, Harold Tracy, London.
Reed, Austin, London.
Richards, Ivor Islwyn, London.
Robertson, Mrs. Lucy Ann, London.
Sadgrove, Walter Arthur, South Croydon, Surrey.
Salaman, Raphael Arthur, B.A., London.
Turner, William McAllister, Chester.
Walker, Mrs. M. E. M., Nairn, Scotland.
Weenen, Henry Hart, London.
Weld, Herbert, D.Litt., J.P., Lulworth Castle, Dorset.

Further consideration was given to the award of the Albert Medal for 1930.

A report of a sub-committee on the Charing Cross Bridge plans was considered.

The Chairman reported that the Executive Committee in charge of West

Wycombe had met at the village on February 22nd, and had examined the various buildings there. Arrangements were approved for leasing one of the factories.

The use of the name of the Society as a supporter of the Rural Amenities Bill was sanctioned.

It was reported that the number of entries for the April Examinations was 31,219, as compared with 25,497 in 1929—an increase of 5,722.

Papers offered for reading before the Society in Session 1930-1 were considered.

A quantity of financial and formal business was transacted.

SIXTEENTH ORDINARY MEETING

WEDNESDAY, MARCH 12th, 1930. SIR OLIVER J. LODGE, LL.D., F.R.S., in the Chair. A paper on " The Human Brain " was read by G. ELLIOT SMITH, M.D., Litt.D., D.Sc., F.R.S., Professor of Anatomy, University College, London. The paper and discussion will be published in the *Journal* dated April 18th.

REPRINT OF CANTOR LECTURES

The three Cantor Lectures on " Wind Instruments from Musical and Scientific Aspects," by Dr. E. G. Richardson, Ph.D., D.Sc., Lecturer at University College, London, have now been reprinted in pamphlet form (price 2s. 6d.), and can be obtained from the Secretary, Royal Society of Arts, John Street, Adelphi, W.C.2.

A complete list of Cantor, Howard and other lectures, which are available in pamphlet form, can be had on application.

PROCEEDINGS OF THE SOCIETY

FOURTEENTH ORDINARY MEETING

WEDNESDAY, FEBRUARY 26TH, 1930

LADY (AUSTEN) CHAMBERLAIN, G.B.E., in the Chair

THE CHAIRMAN said that she was particularly pleased to be present that evening, not only because of her interest in the Italian Exhibition, and the tremendous appreciation of it which had been shown throughout England, but also because she thought it especially appropriate that this meeting should take place at the Royal Society of Arts. She was sure very few people realised the interesting history of the Society, and that one of its many activities led to the foundation of the Royal Academy in the eighteenth century. The Royal Society of Arts started a small exhibition of the work of British Artists, which gradually materialised into the permanent gallery which they now had at Burlington House. Also, they might perhaps be relieved to know that it was quite within the customs of the Society to have one of her sex presiding at that meeting—even as far back as 1760 the Society showed their appreciation and good taste by admitting women members.

This Society devoted more attention to the Industrial Arts than to the Pictorial; evidently once it had a social influence which it might be well to revive. She hoped she might be encouraging an excellent tradition started by great literary ladies like Elizabeth Montague and a circle which, she feared, might be called "highbrow" to-day. Many of those eighteenth century celebrities were portrayed in James Barry's pictures which decorated the walls of the hall in which they were sitting.

To return to the subject Mr. Constable was to speak about that night, the great Italian Exhibition at Burlington House, she was glad to say that they had been able to arrange with the Royal Academy to prolong the Exhibition, so that a still larger number of people would have an opportunity of seeing the most unique and marvellous pictures ever collected in England. She hoped, incidentally, that perhaps this might lead to a greater interest in our own National Gallery where we had some of the finest pictures in the world. She wished the Exhibition could be prolonged for three months instead of 10 days, and then no-one would need to complain like the American lady, doing an Italian Gallery in double-quick time, who said to her husband "Gee, we haven't got much time on this one; you hold the catalogue and I'll look at the pictures!"

She had very much pleasure in asking Mr. Constable to address them about the pictures in the great exhibition.

The following lecture was then delivered :—

ITALIAN ART AND THE ITALIAN EXHIBITION

By William G. Constable, M.A., F.S.A.,
Assistant Director, National Gallery.

The aim of this lecture is not to pick out the plums from the Italian Exhibition; that has already been done by many people, and most of you are now familiar with all the greater masterpieces at Burlington House. My purpose is a different one; it is to put before you, in broad outline, the history of Italian painting as it is exemplified in the Italian Exhibition.

Among the outstanding characteristics of Italian painting is its diversity, not only at different times, but in different places at the same time, a diversity so wide that you can get no single or simple formula which will summarise the whole character of the art. Yet underneath this diversity is a deep-lying unity, which marks out Italian art definitely from that of every other country - a unity, a clue to whose understanding is that the art of Italy is primarily an interpretative and expressive art, as opposed to a decorative or representational art. In other words, the artist in Italy did not use the material that Nature provides to mimic Nature, to hold a looking-glass up to her, nor yet to compose an agreeable arrangement of forms and colours; but in the main aimed at presenting forms so that their character and their relations can be more easily, more speedily, more profoundly apprehended than would otherwise be the case, and in the case of sentient beings, at making more clear the emotions which inspire their actions, and the drama which unites those actions. It is this characteristic of Italian art which makes it one of the more difficult arts of Europe to understand and appreciate. Compare it, in that respect, with the art of Holland, much of which, as you will remember from the great Dutch Exhibition, has simple and less remote aims than those of Italian painting. The Italian artist searches for something more profound. Many people complain of what they call the never-ending stream of Madonnas and of the monotony caused by limitation of the subject. As a matter of fact, that limitation of the subject in Italian art is one of the sources of its strength, because it has thrown the artist back on expressing his own reactions and feelings towards this particular subject. Consequently, under what seems to be a monotony of subject, there is an intense variety of emotion and feeling. Yet at the same time, Italian art is an unself-conscious art. The Italian artist has gone forward to express what he feels, without wondering overmuch what other people will say ; and consequently in the Exhibition at Burlington House there is a feeling of spontaneity, of unfettered expression which is extraordinarily invigorating.

These characteristics of Italian art are in part due to its origins. It must never be forgotten that Italian art developed on soil which was soaked in Greek and Roman art ; that through the ages the influence of Greek and Roman art has been a living force in Italy. So, running through Italian culture, there is a humanistic element more deeply engraved than in the culture of Northern Europe ; and in Italian art there is a deep-rooted feeling for balance, proportion and harmony which is an abiding quality in classic art. Also, it must be remembered that the roots of Italian art lie in that of Byzantium, which was born in Constantinople, and comes from the union of Classic and Eastern art. This is emphatically not an art of representation, but one which seeks to convey ideas and emotions; and any art which springs from it must necessarily turn from representational to expressive aims. Yet though the earliest Italian art is Byzantine in character, human and dramatic elements appear almost at once, while Classic feeling modifies Byzantine austerity. Thus, the Virgin and Child with adoring Monks by Duccio, is Byzantine in the type of the Virgin, and in its monumental character. But human and realistic elements appear in the child and in the adoring monks at the foot of the throne, and a deliberate decorative element is introduced in the rhythmic pattern made by the flowing lines of the drapery. In this and in the dispersed background is revealed a third powerful influence on the development of Italian art, which is too often forgotten ; namely, the influence of Northern Gothic art. In many respects, the painting resembles the work of a French illuminator of manuscripts. This northern influence, exercised mainly through manuscripts and wares, made itself especially felt in sculpture, such as the work of Giovanni Pisano.

While in Tuscany Byzantine art was thus being humanised into Italian art, humanisation of another kind was taking place in the South and in Rome, directly connected with a Classical Renaissance. The influence of this is very marked in the Roman school of the 13th and early 14th centuries, and reaches its height in the work of Cavallini. His masterpiece is the fresco in the Church of Sta Cecilia in Trastavere, where Christ and the Apostles in a Last Judgment became transformed into the deities of Olympus.

These two lines of development, Tuscan and Roman, met in the person of a colossal genius, Giotto, of Florentine birth and Roman training. He stands, with Masaccio, and with Michel-Angelo, for the most complete embodiment of the Florentine genius, with its passion for analysing character and form, and its ability to unite them into a coherent, dramatic and architectural whole. Giotto is a painter whom it was impossible to represent at Burlington House. Most of his work is in fresco and in two or three precious panels; so precious that the question of their transport to England could not be considered. But in the delightful little " Nativity," lent by M. Stoclet, though one would hesitate to say it is actually from the hand of Giotto, yet it is exactly what one would expect him to have painted if you had set him the task of painting a miniature. In it are seen the majestic solid forms we associate with Giotto, united into a monumental design; the human detail gives the painting vitality, but is subordinated to the main dramatic theme of the picture.

In Siena, from the seed sown by Duccio, another type of art developed. In the Annunication, from Antwerp, by Simone Martini, the influence of Northern Gothic is predominant. Though the painter in this and other works is realistic in detail, as were the Northern Gothic painters, the main impulse behind him is not dramatic but decorative; and in place of monumental construction and architectural design, he sought for flowing, graceful linear rhythms. But a warning is here necessary. Thirty years ago it was the custom to stress the difference between the early art of Florence and that of Siena overmuch, and set them in opposition. To-day we realise that this is a forced division, and that the difference is not one of kind but one of emphasis, and that the two arts share many fundamental elements. For example, in the *Virgin and Child*, by Ambrogio Lorenzetti, the monumental aspect of the Virgin and Child reflects the influence of Giotto, while the exquisite decorative detail and the lovely colour make of the painting a Sienese flower garden. Later, indeed, the separation as between the two types of art becomes more marked. The decorative, the dainty, the exquisite continued to enchant the Sienese painter, while he neglected the problems which fascinated the Florentine, and were the main line of development. As an example of the road the Sienese travelled, take " The Adoration of the Magi," by Sassetta, from the Maitland Griggs collection. In this are carried on all the traditions of Gothic illumination—lovely decoration combined with vivid narrative, realistic in detail but quite non-realistic as a whole. It should not be forgotten, however, that Sienese and Northern Gothic deeply affected Florence in the fourteenth century; and in the work of Bernardo Daddi and Lorenzo Monaco at Burlington House may be seen how potent was their influence.

In fifteenth-century Florence, however, the ideals of Giotto re-appear, and are given tangible shape by the great genius of Masaccio. In his "Crucifixion," from Naples, which formed the upper part of the altar-piece, of which the central part is in the National Gallery, is an art which deals in monumental forms and architectural construction, set in three-dimensional space ; together with a search for unity, not only by arrangement of the forms, but by consistency of lighting. At the same time appears another dominant characteristic of Masaccio, powerful yet restrained dramatic emphasis. Similar characteristics mark the famous desco da parto from Berlin. These deschi da parto were trays on which presents of fruit, flowers and sweetmeats were carried to the ladies of Florence after the birth of a baby. In the painting the mother is seen in bed receiving her friends, while trumpeters are marching in front of men bearing the presents. Here is remarkable fidelity in the detail of everyday life ; and yet the whole is harmonised into a noble, majestic and dignified design with a unified dramatic theme.

The development of Florentine art received a tremendous impulse from the influence of the sculptor Donatello, represented by the great David which stands in the central Hall of Burlington House. This is the first standing statue in bronze in the round which had been constructed since Classic times ; it is a classic ideal put into living practice. It is not only realistic in detail, but that realism is subordinated to the harmony and balance of the forms, and of the design as a whole Notice also the feeling for character, and for dramatic effect, so expressive of the feat that has just been achieved.

Another aspect of the dominant force in fifteenth-century Florentine painting appears in the work of the sculptor and goldsmith Pollaiuolo. In the "Rape of Deianeira," from Yale, is exemplified the Florentine interest in anatomical investigation, turned to the purpose of expressing movement. The figure of Hercules bending his bow is an example of muscular vigour, so outstanding that a copy of it was deemed fit by Durer to serve as model for one of his designs. Also the painting reveals another side of the realism of Florentine art, in that the background is a tolerably accurate view of the Valley of the Arno, with the buildings of Florence discernible in the distance.

By the side of painters such as those I have mentioned worked another group in whose work there is a different emphasis, giving the decorative and the narrative sides of painting greater importance. But here again, as in comparing the early Florentine and Sienese, the difference is in stress, rather than in ideals.

Consider the "Attempted martyrdom of S.S. Cosmas and Damian," by Fra Angelico, from the Dublin Gallery. In this little predella panel the primary aim has been the production of a story told in terms of decorative linear and colour harmonies. But Fra Angelico never forgets his Florentine training, as the solidity and movement of the figures witnesses. In Fra Filippo Lippi, on the other hand, the decorative and anecdotal side is liable to gain the upper hand. In the charming "Annunciation," from the Palazzo di Venezia, elaborate description tends to replace architectural design and solid forms in movement. It is a more human art than that of Fra Angelico, but it is also more akin to Northern Gothic in its aims.

These two tendencies, the scientific, realistic, architectural, tendency, and the decorative, narrative tendency, meet and find perfect balance in the work of Botticelli. Consider, for example, his " Calumny," based on Lucian's description of a painting by Apelles. In this picture and in Botticelli's work in general there is a magnificent solidity of individual forms, and extraordinary power of expressing movement, added to which is the power of weaving those forms into a rhythmic and extraordinarily intricate design, a power which gives the masterpieces of Botticelli their outstanding and peculiar character, and brings them nearer than any other western painting to music, where pattern and rhythm, repeated and interwoven, is the outstanding characteristic.

Whatever its character, however, Italian art of the fifteenth century has one very profound and far-reaching difference from that of the fourteenth, in the extent to which humanity plays a part in the painter's material. The aspect of Renaissance thought which made man the central figure of the Universe, the attitude which we sum up under the term " humanism," finds in painting expression as well; and this intellectual and emotional development in Italy must never be forgotten if the change from the Middle Ages into the Renaissance is to be understood.

Florence was not the only centre in which science was brought into the service of art. At Padua, largely as the result of a stay there by Donatello, an important school developed, of which Mantegna is the central figure. In his " Crucifixion," the central panel from the predella of an altarpiece in S. Zeno, Verona, is seen the dominant impulse which inspired his work, an almost fanatical enthusiasm for classical art, as the road to complete artistic salvation. But mere antiquarianism never yet hid a great art; and in Mantegna it gave pretext for the display of greater qualities—searching draughtsmanship, and above all, the organisation of material into a solemn, austere, monumental design. In the " Crucifixion " also the conception is profoundly humanistic. The figures are those of Olympians, not of ordinary human beings, and they are playing out a Greek tragic drama.

The influence of Padua spread widely throughout Eastern and Northern Italy, and nowhere did it find a more remarkable answer than in Ferrara. Here worked Cosimo Tura, Francesco Cossa and Ercole Roberti, all admirably represented in the Exhibition at Burlington House. To Tura has aptly been applied Hokusai's description of himself: " The man mad about drawing," for rarely has there been an artist who drew with such extraordinary intensity, following every convolution of form to produce such a bizarre, fantastic and exciting art.

Meanwhile, in Central Italy, another great school had developed, again under Florentine influence. In Piero della Francesca, a science learned in Florence was turned to the purpose of an art of high dignity, in which also appears what was to become almost a distinguishing mark of Umbrian painting, a feeling for atmosphere and of enveloping light. The meaning of the " Flagellation" of Piero is somewhat obscure, but the most reasonable one is that it commemorates the assassination of Oddantonio, Count of Montefeltro, who stands on the right with two evil counsellors, whose advice led to his people rising against him; while the " Flagellation" is intended as a symbol of the ruler who, through no fault of his own, has been led to punishment and death. The artistic significance is more clear. Here is a remarkable power of combining solidity and a sense of depth with decorative effect, both as regards colour and the spacing of the forms. One of the secrets of this power lies in the use of perspective. If analysed, the picture will be found to be built up of a rigid framework of perspective which holds it together, and also gives the painter freedom in putting his figures where he will while preserving correct relations in space. Another characteristic of Piero is the absence of drama; everything is statuesque; almost the painting seems to reproduce an event in which the actors were frozen into immobility.

As a portrait painter Piero is in the first rank. It is, perhaps, surprising that he, with his passion for expressing space and solidity, should have painted Federigo da Montefeltro in profile. The explanation is that Federigo early in life had his right eye damaged in a tournament, and in consequence he always had himself painted profile left. But no one can help being struck with Piero's power of making evident the rotundity and solidity of the head. Here is something that has cubic capacity, something which is set in space and in light, which at the same time keeps decorative quality.

Piero's younger contemporary, Signorelli, owes far more to Florence than does Piero himself. The " Flagellation," from the Brera Gallery, is a comparatively early work, and enables you to see how much Signorelli owed to Florentines such as Antonio Pollaiuolo, combined with the Umbrian power of expressing space. It does not, however, represent the majestic and monumental side of his genius. That is better seen in the figure of a man on a ladder, part of a " Descent from the Cross," which belongs to Lord Muir Mackenzie. The Umbrian feeling for space reaches its full development in the work of Perugino, and is one of the outstanding characteristics of his great pupil, Raphael.

With the coming of the early 16th century comes the High Renaissance, in which all the elements which have been discussed—those of scientific investigation, dramatic emphasis, humanism, monumental construction and search for atmospheric envelopment, are fused. But in the 16th century they receive a new grouping. Roughly, artists turn aside from realism and decorative charm, concentrating on problems of design and emotional expression. Yet while the High Renaissance, in Florence and elsewhere, is prolific in religious subjects, the sentiment expressed is primarily pagan; since in them man appears as a kind of Olympian or superman, and not as a subordinate in a great Cosmos with a Deity as its centre. In Florence the dramatic element in a picture played a specially important part, receiving its fullest expression in the work of Leonardo. In the famous cartoon belonging to the Royal Academy can be seen how the investigation and analysis of individual character has been employed to almost a morbid degree, and how the artist has sought to link up those individual characters into a dramatic unity. In this concentration on the expression of character and drama lies the explanation of the decadence which nearly always came when painters imitated Leonardo, since the sentimentality which his genius enabled him to avoid was a ready trap to the less gifted. In Michel-Angelo the dramatic emphasis proceeds less from character than from movement. In his " David " (or more probably Apollo, drawing an arrow from his quiver), appears the realism in detail, which is one of the characteristics of Michel-Angelo's work, combined into a monumental whole, in which drama proceeds from the action of the figure. In the treatment of that action another new and important characteristic appears. Instead of the components being arranged to form a whole moving towards a centre, the forces expressed tend to move outwards. The general impression is that of a man trying to burst his bonds, not gathering himself together, and in design of this type lay the seeds of what is called Baroque art of the late 16th and 17th centuries.

In contrast to this characteristic of Michel-Angelo's work is Raphael's method of design. In the portrait of Maddalena Doni the design is self-contained and coherent, its constituent parts always leading towards a centre, giving a monumental reposeful quality.

In Correggio, on the other hand, the construction has the same baroque character as in Michel-Angelo. "La Zingarella," so called from the gypsy-like head-dress of the Virgin, makes you realise clearly how Correggio sought excitement and movement in his design. In Corregio also the emotional side of the art of High Renaissance is extraordinarily well developed, almost to the point of sentimentality. But this can be forgotten in face of his feeling for atmosphere, and his power of treating the play of light over every object, and particularly over human flesh, so that it creates pearly opalescent harmonies, which transport the spectator into a magic world remote from that of everyday existence. To stand in the Cathedral of Parma and see the figures in the dome floating in light and air is an extraordinary emotional experience, and to understand and appreciate Correggio it is essential to go to Parma. Isolated works, however fine, in exhibitions and private galleries, cannot convey the full range of his genius.

Turn now to the great school which has been intentionally neglected for a while, that of Venice. At Venice Byzantine ideals dominated its art well into the 15th century, as may be seen from a group of paintings in Burlington House. But new stirrings came with the rise of the school at Padua. Side by side with Mantegna worked his brother-in-law, Giovanni Bellini, in whose early work is a Mantegnesque austerity and severity, later modified by the suffusion of all his forms by the golden mellow light which we associate with all later Venetian art. In Bellini's " Transfiguration," the forms are singularly noble and dignified, and the design very impressive ; but its austerity and monumental quality are tempered by the action being set in a place lit by the light of a country where it is always afternoon. Thus a poetic, lyric element is imported into the picture. The same characteristic appears in the work of Giovanni Bellini's elder brother, Gentile. In the portrait of Caterina Cornaro the conception is simple, the design monumental ; and yet the painting holds an element of mellowness, partly in the light partly in the colour, which gives it a geniality typical of Venice.

In Venice humanism was pushed to a further degree than in any other Italian city, humanism in the sense of pagan outlook upon life. Venice also was the first wholeheartedly to practise the methods of painting which had been developed in the North by the Van Eycks. The legend that Antonella da Messina studied in Flanders, and thence imported the Flemish method of painting into Venice is exploded; but the recent discovery that he worked side by side with Petrus Cristus at Milan fully explains the strong Flemish element in his work, exemplified in this portrait of a genial person, from the Borghese Gallery. The subtle modulation of the forms here displayed, and the precision and accuracy in detail, were almost impossible except in the Flemish method of painting. Consequently the importation of Northern methods gave the Venetians a power to express subtle variations in light and form which hitherto had been denied to them.

The humanistic and pagan tendencies in Venetian art come to fruition in the work of Giorgione. In " The Tempest," one of his outstanding masterpieces, whatever the theme may be, is expressed that intense feeling for the beauty of the world, and the joy of life, which was so completely to dominate later painting in Venice. With Giorgione Venetian painting enters its most characteristic phase, in which the splendour and glory of Venice and its people are the theme, and Titian and Paul Veronese the chief exponents. In Titian's " Madonna," from Ancona, the swinging design, the gorgeous deep colour, harmonised into a golden tone, the glowing light and atmosphere, are of this world alone.

Yet this feeling for outward splendour and the delights of the world did not prevent development during the 16th century of a deepening sense of the importance of the life to come, and a growing concern of artists with the things of the soul, a reflection of the Counter-Reformation. In Titian's great portrait of Paul III, the outward trappings of temporal power are put on only to be remorselessly stripped off in order to reveal the underlying character of the man. The influence of the Counter-Reformation appears in the work of Tintoretto with singular completeness. In his " Entombment," apart from other factors such as design and colour, a new use of light and shade appears. It is not only used as a means of construction, but to give emotional emphasis; which added a new weapon to the armoury of the Baroque painters. In portraiture also Tintoretto followed the same path. " The Portrait of a Senator " is treated as a means of revealing mind and character, mainly by the handling of light and shade. With the use of a design which tended to move away from the centre, with the exploitation of light and shade, came, in the late 16th century, a revival of realism. All three are combined in one of the masters of Baroque, Caravaggio. The " Flight into Egypt " is an early work and is hardly characteristic. It lacks the brutality of some of his later work, but it contains all the elements of the forced effects, and the desire to impress, which make him the precursor of the cinema. He is the most Hollywood-like artist to be seen at Burlington House.

Contemporary, broadly, with Caravaggio flourished the eclectics, who aimed at uniting the beauties of every type of painting, an unholy mixture liable to produce but a tepid result. The chief examples of this type of painter worked in Bologna and Rome. In the "Madonna della Scala," by Ludovico Caracci, is charming sentiment, skilful grouping, tender light and atmosphere; and yet it is stamped with the mark of second-rate art, due to being consciously modelled on the virtues of greater men. The painter has fallen into the trap of painting something for the sake of painting, and not expressing something he felt.

Another note is struck in some of the work of Annibale Caracci. The figures in his "Flight into Egypt," from the Doria Gallery, are subordinated to the landscape motive, a fine example of that formalised treatment which was the forerunner of the great school of Claude and Nicholas Poussin. Thus Annibale Caracci is a master who not only closed an epoch, but who helped to open a new one.

Only in Venice did the great tradition of Italy survive into the 18th century and produce work worthy of the past. There the great decorative tradition survived in the work of Tiepolo, painter of the "The Finding of Moses," from Edinburgh, with which the Committee have been able to unite a piece which was cut from it. It is a brilliant piece of mural decoration, fit to decorate the walls of an 18th-century house; but it is superficial and slick, the brilliant "last kick" of a great tradition, not a new art. At the same time Tiepolo carries on well an official portrait tradition, in the portrait of a Procurator of S. Marco, an affair full of swagger and display. But it is the office which is painted here, not the man.

But in landscape the achievement laid the foundations of something for the future. Canaletto carried on the architectural draughtsmanship tradition, and united with it the tradition of landscape which Titian had set going in Venice. In his "View of S. Michele," from the King's collection at Windsor, you have all his virtues, his skill in design, his power of suggesting space and enveloping light, and, what is rare in his work, a dramatic element introduced by the working up of the storm from the mainland to Venice. Guardi, thought to be a pupil but really his imitator, was far less occupied with the stones of Venice than with her light, and in his work light plays so large a part that he is a forerunner of 19th century French impressionism. In his "Concert" from Munich, painted in 1782, he has achieved not only an extraordinarily vivid sense of movement, but, above all, a lovely feeling of opalescent light playing over the whole.

There the story ends. In the 19th century, leadership in the art of Europe was definitely taken by France, and in 19th century Italian art is found mainly a reflection of the successive movements in French art, the neo-Classic movement, the Romantic rebellion, the Barbizon School, and finally Impressionism.

DISCUSSION.

The Chairman said she rose with great pleasure to propose a vote of thanks to Mr. Constable for his interesting and instructive lecture. She was sure it would encourage every member of the audience to go to the Exhibition again, this time with a deeper appreciation of the pictures they would see there.

She wished to take this opportunity of publicly thanking Mr. Constable, on her own behalf for all that he had done on the Committees, both the Selection Committee and the Hanging Committee, and on the catalogue. Very few of her hearers could realise the amount of work which was involved in hanging over 500 pictures and arranging them in the very short space of time—there was less than a fortnight—and during that time Mr. Constable worked day and night. She felt most grateful to him for all that he had done for the Exhibition. She asked Major Longden, the Secretary-General, to second it.

MAJOR A. A. LONGDEN, D.S.O. (Secretary-General, Italian Exhibition), said it gave him very much pleasure to second the vote of thanks to the lecturer, and to propose a vote of thanks to the Chairman. He was sure those present had rarely, if ever, heard a more clear and enlightened lecture on the works under consideration. Mr. Constable was what one could call a first-class Civil Servant; he was one of the busiest people in London, yet he was never too busy to carry out additional work well and faithfully. As the Chairman said, few people knew better than she did how Mr. Constable had toiled for the Exhibition. He was not only on practically every Committee but in addition he was ever ready to go far and wide to gather together the treasures which it was now the pleasure of more than 400,000 people to look upon. Mr. Constable had no right to be present to-night; he ought to be in bed, so the speaker was informed. Yet he again carried out his duties and came to enlighten the Society about these great treasures which the Chairman had well advised everyone to inspect.

His second privilege was to propose a vote of thanks to the Chairman. She in some respects, resembled the lecturer, she was more engaged than most people in London in a hundred different ways, and yet, like the busiest people, she was able to carry out yet more work. Those present had been looking at great masterpieces; and he thought they could look at two here. One was the Chairman, the other the lecturer; and the Royal Society of Arts was, as usual, lucky in their selection. The lecture had, he felt certain, pleased all.

The vote of thanks having been carried unanimously, the meeting terminated.

CORRESPONDENCE

MODERN STREET ARCHITECTURE

As an old Fellow of the Royal Society of Arts, I am sorry I was unable to attend the meeting on February 13th, when the discussion arose on the "Modern Street Architecture in London." I have read that discussion in the *Journal* and am entirely in sympathy with the views of Mr. Morley Horder, Mr. Shaw Desmond and Mr Lanchester.

If I had been present I would have pointed out that this American and barrack style of high buildings, such as is being introduced into Park Lane and elsewhere in London and suburbs, is deleterious to health. It is not only a matter of architectural ugliness, with its calamitous effect on an already crowded street traffic, but it is also introducing conditions injurious to the health of the rising generation.

These residential flats, covering every available yard of ground, though possibly a money-making affair for those who are interested in them, are taking the place of small and large houses with their gardens and open spaces, and will ultimately become the slums of the 20th century. We are spending millions to clear away slums of the early 19th century and are now creating slums of a different type.

In order to show what is happening, I send you my four articles on "Open Spaces and Public Health," which appeared in *New Health* in 1927 and 1928, and in which the destructive processes are described and the absolute necessity of having new building laws which shall insist on open spaces and playgrounds of sufficient size for the children and resting places for the old people in connection with every new residential building scheme.

I shall be glad if you will lay these papers on the library table of the Royal Society of Arts, so that any of the Fellows and their friends may have the opportunity of seeing and reading them.

W. J. SIMPSON, M.D., F.R.C.P., D.P.H.

NOTES ON BOOKS

TRADITIONAL METHODS OF PATTERN DESIGNING. By A. H. Christie. Oxford. The Clarendon Press. 10*s*.

"All arts," says Mr. Christie, "would seem to have spent their infancy together in the same nursery. . . . In maturity each developed specially some trait to be found in the childish activities of all." What they all had in common was utility: in the prehistoric twilight the ideal of fitness for purpose was ever before the artist's and the craftsman's eyes.

The weakness of this ideal was never better demonstrated than by Mr. Roger Fry in his introduction to the Third Discourse of Reynolds. Speaking of the human species he says: "The type which tends to predominate is no longer that of the Greek athlete, but that of the city magnate, as highly specialised for certain functions as the giraffe or the elephant. We take the Greek athlete as the central type of humanity because it is beautiful, not because it is, or ever was, really central."

The Patterns were probably first magical in character, and afterwards informative and practical. Such was, and is, the respect of man for the past, for tradition and traditional forms, that we find Renaissance painters turning Mohammedan messages of good-will into meaningless higgledy-piggledy designs, here round a halo, there on the fringe of the Madonna's robe. Mr. Christie gives for an example the great Masaccio at the National Gallery. Visitors to the present exhibition at Burlington House will find other examples if they care to look; there, also, if numbers permit, they will see many lovely patterns of Italian invention, copied by Jacobello del Fiore, Crivelli, Signorelli, and other great men. I am told that the same phenomenon is to be observed in the East to-day: I mean that written words, in this case in European languages, are being twisted out of shape—or into shape—by the Japanese, and turned into motives for patterns.

Even in architecture the creative human mind has not allowed itself to be unnecessarily dominated by materials. As for pattern designing, Mr. Christie says: " . . . . when virtually the same patterns are found occurring over and over again in different kinds of work, it becomes evident that, in actual practice, specific designs have never been absolutely associated with particular ways of working." Later he adds: "Design is the intellectual motive power behind the technique which gives it expression. Technique . . . . is a good servant to design, but never its master." Would this were so!

The intellectual character of painting is not popularly appreciated; people rather fancy that the painter works with an ingenious hand more than with a level head. It is not so easy to fall into the same misapprehension with regard to pattern designing; on the contrary, the designer is thought of as being so *terre-a-terre*, so "hack" and unilluminated a fellow, that he is expected to turn out his patterns with the obedient humility and regularity of a machine turning out sausages.

Mr. Christie's analysis of patterns, geometrical and realistic, regular and irregular, is very thorough and interesting. In addition to sixty plates there are hundreds of illustrations in the text. Many of the figures are curiously satisfying; certain repetitions are, as it were, reassuring and consoling. The reposeful character of much Italian painting is due to an element it has in common with abstract designing, and the very formal appearance of work by some of the painters of to-day is justified by the calm imported into their pictures by that same element.

The perusal of this book by students of design would spare the next generation many horrors.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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MONDAY, MARCH 24..Electrical Engineers, Institution of, at Armstrong College, Newcastle-on-Tyne. 7 p.m. Messrs. H. A. Humphrey, D. M. Buist, and J. W. Bansall, "The Imperial Chemical Industries, Limited's Steam and Electric Power Plant at Billingham." At the University, Edmund Street, Birmingham. 7 p.m.

Geographical Society, at the Æolian Hall, New Bond Street, W. 8.30 p.m. Dr. Emil Trinkler, "Exploration in the Eastern Karakoram and Western Kunlun."

University of London, at King's College, Strand, W.C. 5.30 p.m. Rt. Rev. A. C. Headlam, "Christian Reunion. Lecture IV—The Ministry." 5.30 p.m. Prof. R. W. Seton-Watson, "Outlines of British Foreign Policy. Lecture X—'Peace with Honour.' From Berlin to Midlothian."

TUESDAY, MARCH 25..Anthropological Institute, 52 Upper Bedford Place, W.C. 8 30 p.m Mr. L. S. B. Leakey, "The Relation of some of the Kenya Palæolithic Cultures to those of Europe and South Africa."

Civil Engineers, Institution of, Great George Street, S.W. 6 p.m. (1) Mr. D. Anderson, "Tyne Bridge, Newcastle." (2) Mr. G. L. Groves, "The New Wearmouth Bridge, Sunderland."

Electrical Engineers, Institution of, at the Hotel Metropole, Leeds. 7 p.m. Messrs. H. A. Humphrey, D. M. Buist, and J. W Bansall, "The Imperial Chemical Industries, Limited's Steam and Electric Power Plant at Billingham."

Electrical Engineers, Institution of, at the College, Loughborough. 6.45 p.m. Mr. R. W. H. Couzens, "Terra Hydro-Electric Development, São Paulo."

Illuminating Engineering Society, at the Home Office Industrial Museum, Horseferry Road, S.W. 7 p.m Mr. S. Anderson, "Textile Lighting."

Photographic Society, Royal, 35 Russell Square, W.C. 7 p.m. (1) Mr. W. Clark, "The Characteristics of Sound Recording Emulsions." (2) Mr. W. Clough, "The Pantone Process or Reproduction"

Royal Institution, 21 Albemarle Street, W. 5.15 p.m Dr. Charles Singer, "Inductive Philosophy and some of its Instruments."

WEDNESDAY, MARCH 26..Automobile Engineers, Institution of, at the Engineers' Club, Manchester. 7 p.m. Captain J. S. Irving, "The Golden Arrow and the World's Speed Record."

Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Mr. P. J. Pollock, "Nomography as Applied to Engineering."

Eugenics Society, at Burlington House, W. 8.30 p.m. Dr. J. A. Kyle, "Constitution as a Factor in Morbidity."

Geological Society, Burlington House, W. 5.30 p.m.

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds. Annual Lecture. Mr. William Taylor, "Science in Works Management."

North East Coast Institution of Engineers and Shipbuilders, at Bolbec Hall, Newcastle-on-Tyne. 7.15 p.m. Mr. E. G. Lowes, "The Development of Auxiliary Machinery as Applied to Ships."

THURSDAY, MARCH 27..British Gliding Association, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 6.30 p.m Inaugural Meeting.

Chemical Society, Burlington House, W. 4 p.m Annual General Meeting.

Electrical Engineers, Institution of, Savoy Place, W.C 6 p.m. Mr. H. H. Harrison, "Developments in Machine Telegraph Systems and Methods of Operation."

L.C.C. Geffrye Museum, Kingsland Road, E. 7.30 p.m. Mr. E. R. Gribble, "Lacquerwork: Its History, Influence and Decorative Qualities."

Mechanical Engineers, Institution of, at the Royal Technical College, Glasgow, 7.30 p.m. Mr. E. Bruce-Ball, "Automatic and Remote Supervisory Control of the five Hydro-Electric Power Stations at the Sugar Loaf-Rubicon Scheme, Victoria, Australia."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m Mr. J. B. S. Haldane, "Some Problems of Genetics."

Rubber Technologists, Institute of, at the Manchester Café, Ltd., Exchange Buildings, Manchester. Mr H. Riding, "Some Notes on Ebonite."

FRIDAY, MARCH 28..Electrical Engineers, Institution of, at the Engineers' Club, Manchester. 7.15 p.m. Mr. J Calderwood, "Marine Installations with particular reference to Auxiliary Machinery."

Junior Institution of Engineers, at the ROYAL SOCIETY OF ARTS, Adelphi, W.C. 7.30 p.m. Mr. G. S. Taylor, "Industrial Accidents: Their Cause and Prevention." (Quadrennial Gustave Canet Memorial Lecture.)

Physical Society, at the Imperial College of Science, South Kensington, S.W. 5 p.m. Annual General Meeting.

Royal Institution, 21 Albemarle Street, W. 9 p.m. Sir E. Rutherford, "The Transmutation of Matter."

SATURDAY, MARCH 29..L.C.C. Horniman Museum, Forest Hill, S.E. 3.30 p.m. Mr. J. B. Dallas, "June Flowers in Alpine France."

Royal Institution, 21 Albemarle Street, W. 3 p.m. Sir E. Rutherford, "Atomic Nuclei and their Structure." (Lecture IV.)

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4036 *FRIDAY, MARCH 28th, 1930* VOL. LXXVIII

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> "*I have found that Bureaucracy is the greatest assassinator of all creative invention or experiment.*"
>
> *C. R. W. Nevinson.*

Italian Exhibition.—The great Italian exhibition has closed, and in order that the necessary preparations may be made for the annual Academy exhibition of contemporary paintings and sculpture. Recent events remind us rather pointedly of our failure to recognise the splendid tradition of national art. We crowd to see the wonderful collection of Italian pictures, but we rather wonder how much enthusiasm would be aroused by an exhibition of English art since 1300? There is to be an exhibition of Medieval art at the South Kensington Museum shortly, but will the public crowd there with any enthusiasm or with any sense other than an antiquarian curiosity? We understand the exhibition will be mainly ecclesiastical.

Mr. Archibald Russell, whose knowledge of the work of the old masters of all countries is so informative, has, we believe, suggested that an attempt should be made to collect the work of notable English artists and to hold an exhibition on the scale of the Flemish and Italian collections. We think the result would be surprising, more to the Englishman than to the foreigner, for it was France who first recognised the work of Constable in landscape painting and most of our great artists have worked in Paris and abroad in their early days to get the atmosphere for their later work. This country has always been full of talent in all branches of art, but the tragedy is that it has seldom found the necessary patronage to make a living.

The Royal Society of Arts has recently called attention to the genius of Alfred Stevens. His work should, undoubtedly, hold its own with the great masters of the world, and there are many others whose work still goes almost unrecognised in this country. The Royal Society of Arts room was crowded to overflowing to hear Mr. Constable's lecture on Italian Art; it was equally full to hear Professor Elliot Smith on the "Human Brain," but only a very small handful of people came to listen to Mrs. Arundell Esdaile lecture on "English Monumental Sculpture," with the distinguished chairmanship of Mr. C. R. Peers, President of the Society of Antiquaries. No one had realised until Mrs. Esdaile had made a study of the subject, what a delightful art of sculpture we possess in our churches and buildings of the 17th and 18th centuries. What can one expect when we pull down Temple Bar and in its place put a monument whose decorative sculpture is so appalling? What Londoner, unless he frequents the new Old Bailey, has ever seen the splendid statues of Charles I and Charles II standing in the upper hall in the most unworthy recesses, not even competent to contain them? What wonderful national possessions!

Mrs. Esdaile showed many beautiful examples and also made the Society further acquainted with the works of Carlini, an example of whose vigorous sculpture stands in the Hall of the Society, and has been recently described in the *Journal*.

The work of collecting the great examples (often almost unknown), of national art and sculpture, would be a fascinating one, and the Society might well organise such an exhibition of all the arts. It is interesting to read the following in the *History of the Society*.:

> In 1753 a number of artists under the chairmanship of Francis Hayman held a meeting notified as follows :—"There is a scheme on foot for creating a public Academy for the improvement of painting, sculpture and architecture and it is thought necessary to have a certain number of professors with proper authority making regulations, taking subscriptions, etc., erecting a building, instructing the students, and concerting all such measures as shall be afterwards thought necessary. Your company is desired at the Turk's Head in Gerard St., Soho, on the 13th of November, at 5 in the evening, to proceed to the election of thirteen painters, three sculptors, one chaser, two engravers and two architects in all twenty-four, for the purpose aforesaid.
>
> (*Signed*) Francis Milner Newton, Secretary.

While the Royal Society of Arts may take a legitimate pride in the share it had in preparing the way for the exhibition of the Royal Academy, it may also congratulate itself on the fact that the attempt to concentrate in the hands of a single institution, the work of supervising and promoting all the arts in this country did not succeed.

Ruislip Association, Middlesex.—The following interesting communication comes from this Association :—

"It is gratifying to report that good progress is being made in educating and marshalling public opinion in Ruislip in favour of preserving its ancient houses and what remain of its rural amenities. For the impetus given to this movement lately, thanks are due, in no small measure, to the encouragement offered by the Preservation Committee of the Royal Society of Arts.

That present-day Ruislip has some reason to take pride in its past can easily be shown by reference to the work of the Rev. Daniel Lysons, M.A., F.R.S., F.S.A., compiled in 1800 as ' An Account of the Parishes of Middlesex.'

Not every place on the map can boast a record in ' Domesday,' nor surely, can there be many offering so wide a choice in the documented spelling of its name or so rich a variety of authentic pronunciations. In ancient records there are no fewer than seven variants in spelling, not one of which corresponds either with that in use in 1800, viz., ' Riselip,' or the one current to-day ' Ruislip.'

The Domesday record shows that the Manor of ' Rislepe ' was held by one, Ernulfus de Hesding ; that there was pasture for the cattle of the Manor and a park for beasts of the forest, pannage for 1,500 hogs, and 20 pence rents : the total value being £20 per annum

This Ernulfus de Hesding gave the Manor to the Abbot and Convent of Bec Harlewin in Normandy. As long after as 1253 the Abbot of Bec had a Charter of free-warren in this Manor.

Still later, Henry IV, having seized all the possessions of the alien priories, granted this Manor to his third son, John, Duke of Bedford. At the death of the Duke in 1436, it was in his possession, and was valued at £68.

Some quarter of a century later, during which the Manor had been held by John Somerset, and after his death by the University of Cambridge, Edward IV granted the Manor to the Provost and Fellows of King's College, Cambridge, whose property it has remained until the present day.

These fragmentary extracts serve to show how authentic are the records concerning the large slice of the Parish of Ruislip covered by the Demesne of the Manor. Nor would it be merely fanciful did we glean from them hints of the traditions that may be enshrined in the site of the Manor Farm and even in the buildings which still survive.

These stand on a slight eminence above the River Pinn, by the ancient moat, and are within a stone's throw of the centre of the Village, with the main entrance to them running from the cross roads by the Parish Church.

The buildings comprise an interesting half-timbered house with additions made in Georgian and again in Mid-Victorian days, and three very fine barns and out-houses.

Ruislip people feel that their representations should have the more serious attention, since the Title under which many of these small occupying owners of houses and gardens in Ruislip hold their property is but once removed from that granted to the College by Edward IV in the middle of the fifteenth century.

Together with the group of houses surrounding the Church, they make up so characteristic a bit of old English domestic architecture that many of the people to whom this aspect of the village formed the original attraction to Ruislip are determined, if possible, to preserve them in something of their original condition. There is a general feeling in the village that so eminent an educational body as the Provost and Fellows of King's College can be relied on to give sympathetic consideration to any effort to preserve what still remains of the ancient buildings of the Manor and the surrounding amenities."

The values of the estate would surely be enhanced if the surroundings of these old buildings were laid out with some distinction. The Ruislip Association have sent ten guineas to the Secretary of the Royal Society of Arts to mark their appreciation of the encouragement which the Society has given to the Association in their efforts to preserve this corner of their village. The Society is most grateful, for this contribution which will be put towards the Society's preservation fund.

Thorpeness.—The Royal Society of Arts has received an interesting and appreciative letter from Mr. Stuart Ogilvie, the pioneer of the beautiful village of Thorpeness, which was referred to in the *Journal* a week or two ago. We are glad to have the appreciation and support of people who, like Mr. Ogilvie, are working for the Rural Amenities and beauty of England, and we, in turn, would like them to know that, in whatever branch they are working, we shall be only too pleased to support them in any way we can, and to have their ideas on these subjects. Mr. Stuart Ogilvie writes :—

Dear Sir,

I beg to thank you very heartily for your courtesy in forwarding me the March number of your extremely interesting *Journal of the Royal Society of Arts.*

I am still more grateful to you for having drawn attention to my twenty-two year effort to preserve the fast vanishing beauty of our English rural life.

I venture to enclose a little leaflet which very briefly explains our object and its rapidly growing fulfilment.

Events have proved that our work has only to be more fully known to yet further accelerate our developments. Were I a young man I should be perfectly ready to allow the place to develop as it always has done by the personal recommendation of those who love it, but at 72 I clearly cannot expect many more years of useful activity, and I am grateful to anyone who can give us the much needed publicity.

I deeply appreciate the generous and most encouraging sympathy you have shown towards our endeavour. I fully agree with you that attempts to stem the tide of commercial hideosities need not be, and ought not to be, all upon the same lines. It does strike me very forcibly, however—and I have expressed my views on this matter in more than one leading London newspaper—that it is simply idle for the leaders of art and culture merely to lecture the public. They have got to point out any sound and responsible commercial undertaking that is making, or has made, a financial success by respecting the rules that have always regulated high art instead of following the easy road of industrial opportunism.

Again thanking you very sincerely for your valuable assistance,

Believe me,
Yours very faithfully,
G. STUART OGILVIE.

Grosvenor House Scheme, Westminster.—The most important thing now-a-days is that Art, and above all architecture, should be decided on and criticised by the layman, that the country at large should be educated, and encouraged to discuss these things and voice their opinions as to what the future of their cities and villages is to be.

We are standing at the cross roads; we demand an architecture suitable to the simplicity and rush of modern life, and it is for the country to decide what it is to be. Is it to be worthy of the great tradition of English architecture or are we to be cheaply and incongruously Americanised ?

In this connection it is interesting to consider the new housing scheme at Westminster, designed by Sir Edwin Lutyens, the lay-out and drawing of which is reproduced in *The Builder* this week.

It is a series of simple square blocks in brick, well proportioned and connected by little one-storey incidental architectural links reminiscent of the Paragon at Blackheath.

The illustrations, we are sure, give no idea of the scheme (it would need a model to do that), but in Sir Edwin's hands we do feel that the opportunity he has here, to pick up our lost traditions and adapt them with personal distinction to this part of London, will not be lost. His work in Park Lane has been misjudged and cannot be understood until there are more supporting blocks to reduce the scale to the street. Here in Westminster Lutyens has an opportunity such as Adam had in the Adelphi, and Nash in Regent Street and the Park, and the advantage of one mind controlling the façades of a large area of building will, we hope, be demonstrated once and for all.

The Wren Society.—Volume XI of this Society's publications is just out, and so full of interesting matter that it calls for special notice later on. The whole series is admirably produced, and as the volumes are only issued to subscribers we hope there are sufficient members of the Wren Society to warrant further additions to so valuable a record of the work of Sir Christopher.

The Royal Academy and Architecture.—Turning over the pages of this volume of the Wren Society, we are impressed with the simplicity of the draughtsmanship. Wren would not stand a chance in a modern competition, so devoid is his expression of any tricks of draughtsmanship as we understand them, but how completely they express all the requirements of design and proportion ! We observe with satisfaction that the Academy is realising that simple geometrical outlines best express architectural forms, and that these should refer to actual buildings and be read with photographs.

This is a real step towards educating the public to observe buildings and their proper method of expression on paper.

Ewell By-pass Road.—The following resolution was passed at a meeting held on the 7th March at Ewell Lecture Hall:—" That this meeting of local residents from Ewell appeals to the Surrey County Council and other authorities interested, to delay action, and refer the whole matter to the Greater London Regional Planning Committee for their further investigation before coming to a decision."

The reply of the Surrey County Council to this resolution by the hand of their Clerk, Mr. Dudley Aukland, is as follows :—

" I submitted your letter of the 10th, containing a resolution recently passed at a meeting by the residents of Ewell, to a meeting of my Highways and Bridges Committee held yesterday, who decided to take no action thereon."

Miss Glyn, of Ewell, whose family have so long been associated with this still beautiful village, writes as follows :—

> " It seems like an act of tyranny that absolutely no account should be taken by a County Council of the following representations made to it : Firstly, a petition signed by 1,200 inhabitants, *i.e.*, one-fourth of the total adult population ; secondly, a mass meeting of 500 persons giving a unanimous vote ; yet this has happened in the case of the Ewell protest against the Council's by-pass road. It should be remembered that such numbers are simply enormous for a village, the hall being literally packed and a large number turned away who could not get in, or the vote would have been still larger. It savours more of the action of an autocratic king than of a democratic council. Ewell is too small to possess an Urban Council and, therefore, can be brushed aside."

The Royal Society of Arts would welcome some clearer statement (illustrated by a larger plan), of the arguments on both sides—they cannot believe that the Ministry of Transport would refuse to intervene in the controversy to save Ewell, if it can be done without detriment to other community interests.

Subsidised Art.—With all the recent talk about National Theatres and the idea of the subsidising of various branches of art by the Government, we have now a very interesting argument from the other camp, by Mr. C. R. W. Nevinson. He points out the extraordinary interest in art occasioned by the recent exhibitions at Burlington House, at which people cheerfully paid 1s. 6d. and 5s., and went in their thousands; while the attendance at the National Gallery, one of the finest collections in the world, is pitiful at all times. He even suggests the interesting experiment of making our national museums and galleries into paying and commercial concerns, and thinks there would be a much greater public interest in art if this was done.

This is, of course, rather an extreme idea, but it has its points; there is always a certain interest when commerce and competition are concerned, especially in England, where the public always need some sensation or publicity to start their interest in any art. Mr. Nevinson has raised a very interesting question, but we still believe that England badly needs a national theatre and national opera as some sort of a centre for these arts, even though, like the National Gallery, they may be chiefly patronised on wet days. A large state subsidy, as there is in Germany, would no doubt, kill art in England, but every country needs one theatre, opera house and picture gallery which is not subjected to every wind of chance.

Books.—With the advent of Maurois' *Byron*, and Miss Edith Sitwell's *Study of Pope*, lovers of really excellent biography should have nothing to complain of. When we say " biography," it seems rather a circumscribed expression for such perfect works of art as these two. In both cases the author has been able to infuse his or her personality into the work without in the least detracting from the character they are portraying. In the case of *Byron*, it is an exciting story of love and adventure which it is hard to put down. On the other hand Miss Edith Sitwell writes about Pope in such exquisite prose, so fragrant of the period, yet keeping her central figure well in the foreground. These two are both brilliant achievements, to which we should like to refer at greater length.

Mr. Bechofer Roberts is certain to raise a storm of criticism with his striking novel *A Coat of Many Colours*, which is the story of Joseph, not in modern dress, but in modern language, a story which rather deliberately sets out to break down any idea of sanctity in connection with the family of Abraham. It is excitingly and brilliantly written, and taken apart from the biblical connection is a first-class sensational plot, but it is spoilt by a certain iconoclastic joy, an underlying atmosphere of delight in dragging all these patriarchs in the dust and exposing them for what, except by the grace of God, they might have been. But to some of us who venerate, even if we may not believe in the necessarily divine inspiration of the Old Testament, it is not in very good taste, and needlessly ugly and cruel.

Drama.—There has been much talk about the production of the " Lion Tamer," a play translated by Charles N. Spencer from the French of Alfred Savoir, and now being played at the Gate Theatre. It is frankly one of those plays which never ought to have been anglicised. Whatever wit or plot there was should have been treated as only the French can treat these things—with that extreme lightness of touch and wit which invests the wildest plot with interest and turns crudeness into subtlety. In English it is both unintelligible and coarse, and though it is played with great charm and finish by Mr. Ernest Thesiger, Miss Jeanne de Casalis and Mr. Martin Walker, even they can do nothing to mitigate the absurdity of such a play, which leaves one with the unsatisfactory feeling of being cheated and bamboozled. The Gate is a little theatre which for years has been doing excellent work and producing plays which otherwise would never be seen. It is one of the little so-called "highbrow" theatres which has justified itself, survived the most enormous difficulties, and is now fairly established, but it is curious that this, to our mind, one of the least interesting of its productions, should be having such a great success. It shows the extraordinary mentality of the English theatre-going public that night after night they pack a theatre to see a play the majority of them cannot possibly understand, because everybody says they ought to go, because they hear it is " risqué," because clever people have said it is clever, and because they do not dare to say they have not understood it; and thus it is that successes are made in the world of the intelligentsia and their followers! Poor English theatre, no wonder we despair of it.

The entrance to the Gate Theatre is most interesting; there is a vast glaring cinema in Villiers Street, blazing with posters and electric signs, and tucked away in a corner is a little side door into the smallest theatre in the West End, a theatre which is literally making theatrical history in London. The contrast needs no comment!

Picture Exhibitions.—There are two interesting exhibitions at the Leicester Galleries, pictures by Berthe Morisot and Winifred Nicholson. Berthe Morisot who was a disciple of Manet came very much under his influence—she died about 30 years ago—and has a considerable reputation among women painters. Hers is a very charming and delicate art, full of sun and beauty of line, and there is a kind of quiet happiness in her pictures which is very refreshing after the strident colours and restlessness of some of the modern generation. There are a few portraits, decoratively treated, and many views and garden scenes. The whole exhibition has an atmosphere of its own and is well worth a visit.

Winifred Nicholson, who is holding an exhibition at the same gallery, has not the subtle art of Berthe Morisot, but possesses a good sense of colour which covers her deficiency in drawing, also a very direct and clear method of putting on paint. Hers is a more vivid and childlike art and she is much more of an impressionist, but pictures like her " Cineraria and Cyclamen " are delightful. She is not so successful in portraits, though one or two of a baby are good; she treats the baby rather like the flowers—a vivid impression of sunshine and colour.

The third of a trilogy of women painters is an exhibition of the work of Mary Koop at the Brook Street Art Gallery; these are delightful paintings both in their magnificent technique and freshness of colour. She employs an entirely different method to the other two; there is no misty sunlight or impressionistic effects, and while in a way it is absolute representation of the subject, yet it is done with such a sense of beauty and such a sure touch that the result is altogether satisfying. We especially noticed " Bodiam," the castle reflected in the moat, and some smaller pictures of the Riviera country.

Australian Timbers.—At a time such as the present, when public attention is directed more and more to the resources of the Empire, it is peculiarly appropriate to mention one section of the Empire and one of its resources, namely Australian Timbers, which in the past few years have found much favour amongst architects and users.

It may be said that the British Empire Exhibition was the beginning of the present campaign to interest this country in Australian timbers. From the time of the Exhibition onwards progress has been steadily made, until at the present time a number of these woods are quite widely known, and used, on their merits.

It is not irrelevant to mention that the policy of those responsible for introducing them has been to a certain extent conservative, in that it has been considered wisest not only to concentrate on those timbers of commercial value, but to keep supplies in the hands only of responsible merchants, with a view to ensuring that architects and other users will have nothing but timber of the right quality.

Although valuable support has been received from architects, this is not yet quite as general as could be wished. The chief reason for this is not far to seek, as obviously an architect with a reputation to uphold must assure himself not only that the timbers he specifies are suitable for his work, but also that they are available from stocks in this country.

There are now quite a number of merchants who do hold stocks, but this number will not increase perceptibly unless more and more demand is created by architects continually specifying the timbers in question.

The following brief descriptions of some of the woods which are of most interest in this country may not be amiss.

FLOORING WOODS

Jarrah
Karri
Tasmanian Oak

The first two are very similar both in properties and appearance and rank amongst the best hardwoods in the world in their qualities, and this especially with regard to their resistance to fire. In colour they are a warm reddish brown which mellows with age, and being very close grained maintain an excellent surface under constant traffic.

Tasmanian Oak has many of the qualifications of the other two, and is regarded as one of the finest flooring woods obtainable.

When finished and polished it possesses a silky sheen which is quite peculiar to this timber alone and is a valuable factor in decorative effect.

It differs from Jarrah and Karri in colour, and in this respect, although not of the "Quercus" family, closely resembles the old world oaks. All these timbers are supplied free of sap and knots and are rift sawn, and on account of the fact that they are obtainable in exceptionally long lengths are peculiarly suitable for high-class dance floors. This point also ensures improved construction on any floor.

It should be added that the price of these flooring woods is less than that of any foreign hardwood which is comparable from the point of view of appearance and durability.

DECORATIVE WOODS

Queensland Walnut is regarded as one of the most beautiful of Australian timbers. It is fairly heavy, of a chocolate colour, approaching English and American walnut, planes and dresses well and takes a good polish. It is very often obtained with an attractive stripe effect of chocolate and lighter brown.

Blackbean is another very fine decorative timber, not unlike walnut in colour and is most effectively used in quartered figured panels.

Silky Oak is a very ornamental wood noted for its size and the number of its medullary rays. Being mild to work and polish, it is a first-class wood for all joinery and cabinet work and is also much used for panelling and fittings.

Tasmanian Myrtle, a general all round utility wood, pale pink in colour, is mild and easy to work and can be stained to represent either walnut or mahogany. It is an excellent furniture timber.

It is impossible to describe the qualities or uses of these timbers with any degree of accuracy, and for those who are interested in this matter it is, perhaps, sufficient to mention that there is a very representative exhibition of these at Australia House, and in addition to exhibits of panelling, flooring, etc., there are also exhibits of a number of other timbers not mentioned in the above notes, such as Brushbox, Spotted Gum, Tallow Wood, etc. It is hoped that all users who are genuinely interested will avail themselves of an opportunity of seeing for themselves the undoubted beauty and utility of some of the Australian timbers.

NOTICES

NEXT WEEK

MONDAY, MARCH 31st, at 8 p.m. (Thomas Gray Lecture). COMMANDER F. G. COOPER, R.D., R.N.R., " Aids to Navigation." (Lecture II).

WEDNESDAY, APRIL 2nd, at 8 p.m. (Ordinary Meeting). NATHANIEL LLOYD, O.B.E., F.S.A., " Building Craftsmanship." PROFESSOR CHARLES H. REILLY, O.B.E., M.A., F.R.I.B.A., Director, School of Architecture, University of Liverpool, will preside.

The paper will be illustrated by lantern slides.

FRIDAY, APRIL 4th, at 4.30 p.m. (Indian Section). LIEUT.-COL. SIR WOLSELEY HAIG, K.C.I.E., C.S.I., C.M.G., C.B.E., Lecturer in Persian, School of Oriental Studies, University of London, " The Maratha Nation." (Sir George Birdwood Memorial Lecture). SIR E. DENISON ROSS, C.I.E., will preside.

Tea will be served in the library from 4 p.m.

THOMAS GRAY LECTURE

MONDAY, MARCH 24th, 1930. CAPTAIN H. C. BIRNIE, D.S.O., R.D., R.N.R., Elder Brother of Trinity House, in the Chair. COMMANDER F. G. COOPER, R.D., R.N.R., delivered the first of his course of three lectures on "Aids to Navigation." The lectures will be published in the *Journal* during the summer recess.

DOMINIONS AND COLONIES SECTION

TUESDAY, MARCH 25th, 1930. COL. SIR HENRY G. LYONS, D.SC., F.R.S., Director, Science Museum, South Kensington, in the Chair. A paper on "The Work of the British Association in Relation to the Empire" was read by MR. O. J. R. HOWARTH, O.B.E., M.A., Secretary, British Association for the Advancement of Science. The paper and discussion will be published in the *Journal* dated May 9th.

PROCEEDINGS OF THE SOCIETY

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SEVENTEENTH ORDINARY MEETING

WEDNESDAY, MARCH 19TH, 1930

CHARLES REED PEERS, C.B.E., P.S.A., F.B.A., in the Chair

THE CHAIRMAN, in introducing the lecturer, said that all those present were familiar with the greater part of the history of sculpture in this country, especially in the great days of Gothic art, and were aware that in those days portrait sculpture practically did not exist. The effigies, of which there were so many, and which were such admirable works of art, were only very rarely intended to represent the people whom they commemorated. Thus it happened that the fact had been rather neglected that in the later days of English history, from the 16th century onwards, there arose a school of portrait sculpture in relation to monumental effigies in this country which had considerable merit. But as this belonged to the period generally supposed to be the period of decadence, the work had not received the attention which it should have done. The lecturer had worked most thoroughly over this ground, and had brought evidence to show that much work had suffered undeserved neglect It might be said that the portrait sculpture of the 17th or 18th century was not really comparable with that of the 15th or 16th century, and, of course, in a way this was true ; the merits of the two periods of sculpture were different. But there were excellences in both. Those who had been to the Italian Exhibition in London would recall the great picture in the big room of Tiepolo, the Venetian, in the 18th century, which held its own so well with the masters of the 16th. Even in the later period, therefore, inspired work was done which was comparable to that belonging to the earlier and happier ages, and the same thing was true in English monumental sculpture.

The following lecture was then delivered:—

THE PORTRAIT IN OUR LATER MONUMENTAL SCULPTURE

By KATHERINE B. ESDAILE

" Portrait painting," said Hogarth in those tantalizing *Notes of My Life*, which show how great an autobiographer we lost in him, " has succeeded and ever will succeed better in England than in any other country " ; and I hope to-night to show you that the saying is equally true of our portrait sculpture.

Portrait sculpture to most people suggests a series of dismal busts in the Chantrey tradition, lifeless and grim, with a fragment of meaning, less drapery over the shoulders, and blank vacant eyes ; but it is not in such things that we must look for examples of the height to which this type of English art can attain.

But you may well ask why I have confined my lecture to later monumental sculpture. The reason—and it is all too little realised—is, that English sculpture from 1500-1730 was almost wholly monumental. There were a few busts and statues of a commemorative nature besides, but there was almost nothing else. Stow praises the Worshipful Company of Marblers, just before their incorporation with the Masons' Company, for " their admirable skill in the cutting of tombs and monuments "—not a word of anything else ; and a century and a half later, Hogarth's friend, J. F. Rouquet, who lived in England for seven years and in 1755 published his *Etat des Arts en Angleterre*, says explicitly : " it is only of quite recent years that English sculpture has been anything but funerary, but it is now being applied to other purposes."

It is in our monuments then that we must seek our portraits, though I have ventured to include three statues intended for public places, for, with a very few exceptions, it is our post-mediæval monuments that concern us. In the Middle Ages the monument was hardly ever a portrait ; the sculptors—tomb-makers as they were usually significantly called—lived near the source of their material, the stone-cutters near the stone quarries, the alabasterers near the alabaster quarries of the Midlands, the Purbeck marblers in or around Corfe. The patron sent his orders for an effigy, knight, lady or priest ; the sculptor sent a figure out of stock, made personal by the addition of heraldry and supporters ; the monument, sent by water or by ox cart, was duly erected, and painted and gilded on the spot. A portrait was simply out of the question under such circumstances, though it is possible that some royal effigies may have been based on the wax masks carried in funeral processions, but that the later mediæval figure may look like a portrait is not in the least surprising. The sculptor was as realistic as he knew how to be, just as the mediæval painter of saints made these saints even more lifelike ; this does not mean that the result was a portrait in our sense of the word, and the few surviving agreements prove that such a thing was simply not expected. Many of you will know the superb and most realistic effigy of Beauchamp, Earl of Warwick, at Warwick. Its date is 1475, its portrait qualities most convincing ; but all that the sculptor was asked for was " an image of a man armed." The sixteen statuettes

Roger Owen. Condover. By L. F. Roubiliac (1746).

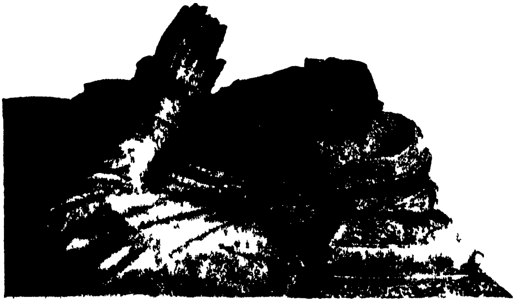
Brigadier Luke Lillingston and his wife, Elizabeth. North Fernly, Yorks. Probably by Edward Stanton (1714).

Sir Orlando Gee. Isleworth, Middlesex. By Francis Bird (1705).

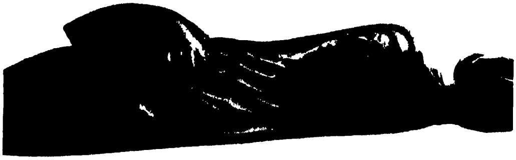
of his kindred round the work are equally vivid personages. Mr. Philip Chatwin has shown that they do not in the least correspond with contemporary descriptions of their subjects, and that, therefore, they are not portraits at all. But after 1500 there was a change. Wolsey and Henry VIII were connoisseurs and collectors, and patrons on a great scale of contemporary artists. Henry tried to get Titian and Raphael to England, and in fact got Raphael's right hand, Luca Penni, and he got Holbein; he tried to get Benvenuto Cellini, who tells us he had no taste for going among those brutes the English ; he turned down Baccio Bandinelli's designs for his own monument, but he got Torrigiani to execute his father's, and the results of that sculptor's noble effigies and rich Italian detail were far-reaching. So far as I can ascertain he introduced the cherub, which, because unfamiliar before, was not banned when the Reformation put a stop to the use of saints and angels, and the cherub, in one form or another, is a notable feature of our later monumental sculpture. But above all, the reign of accurate portraiture had begun ; Henry VII's Chapel took rank at once as one of the sights of London, and people who saw the effigies, like the nobles who patronised Holbein, were no longer contented with mere "images of a man," or of "a faire gentlewoman with the habiliments proper thereto," to commemorate their own dead or themselves. The circle of patrons, moreover, had increased enormously. The new nobility, the great merchants, and the country squires, fast rising into wealth now that the country was no longer liable to be overrun by bands of roving men at arms, all required dignified memorials in their parish churches, and it was quite an ordinary thing for a great man, either to erect his tomb in his own life-time, or to set his name in token of approval to a " plot " or working drawing of one to be erected after his death in accordance with his will. One such drawing exists with the patron's caustic comments in the margin to the effect that his wives are represented in farthingales, with skirts showing their ankles. The existing monument shows them with dresses of adequate length and ankleless ; but I suspect that Sir John Gage must have been trying as a husband as well as a patron.

Another consequence of the changed condition of the age was the growth of the capital, against which Elizabeth issued edicts in vain ; and with this growth, and the ever-increasing tendency of men of every class to visit London, it became important for sculptors to be more accessible. Instead of living near the quarries, they set up yards in town where their patrons could get at them. In unbuilt-over Southwark and in Camberwell, in St. Martin's Lane (and even in the 1750's one family was still making a pipe of wine a year from grapes grown in their garden there), in Holborn and Bartholomew Close, all with access either to water carriage or to good main roads, English sculptors settled along with foreigners attracted by the enormous opportunities offered by this country, and the provincial schools began to decline and dwindle.

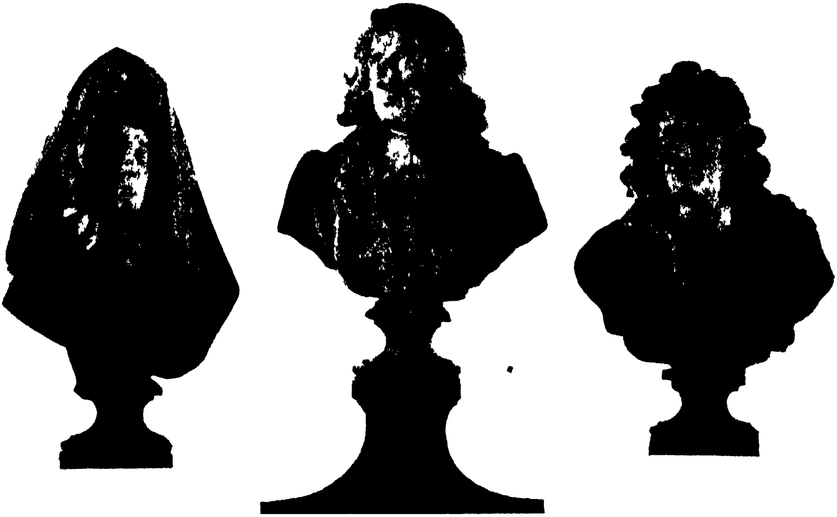
In 1544, when the second Earl of Rutland died, his family sent to Burton-on-Trent, which had succeeded Nottingham as the centre of the alabaster industry, for a sculptor Richard Parker, who designed a very noble monument ; only forty



Lady Williams (Thame, Thame). By unknown Sculptor (155[illegible])



Lady Berkeley (Cranford, Middlesex). By Nicolas Stone, Junior (163[illegible])



The Shiers Monument, Great Bookham, Surrey. Probably by Edward Hurst (168[illegible]) years later, when the 3rd and 4th Earls died within a year of one another, the commission for their monuments went to the Johnson studio in Southwark, that for the monument of the sixth Earl to Maximilian Colt in Bartholomew Close. Justice Shallow went to the Johnsons for his; somehow one feels it in character that he should have put up his own; in 1614 Shakespeare's neighbour and butt, John a Combe, did the same for his monument, and in 1616 the Shakespeare family did the same for the world-famous effigy; but Combe and the Shakespeares could not, or did not afford to pay the charges of the great Nicholas Johnson, the head of the firm, whom Justice Shallow had employed, but employed his very inferior younger brother, Gerard, the younger son and namesake of the founder of the yard in the 1560's, with the result that Shallow's monument far outshines Shakespeare's as a work of art.

There is no doubt that the patrons who went to London were perfectly right. Where the London men were ready either to carry out the older form of rigid effigy in the terms of the new portrait art an exact portrait is often specified in the agreements—or to represent a figure reclining, kneeling, or even sitting—these varieties are all to be found before 1600—the provincials went on in the old ways, with melancholy results. The Burton effigies, once so magnificent, went on, as the surviving agreements show, representing the mere "portraiture" or "image" of a man or of "a faire gentlewoman," but the figures grow steadily poorer and more doll-like, and by 1610 the school had petered out. The quarries, of course, went on, but stone and alabaster and marble were now sent as raw materials to London, there to be worked up by the enterprising sculptors who had by degrees absorbed the available talent of the provinces; and it was the finished monument that now went from London to the provinces instead of *vice versa*. Water, where possible, ox carts where water was not available, and sometimes both, were the means of transport. We read of twelve and fifteen ox carts used to transport a single commission; small wonder that Donne and Burton write of "half-acre tombs," and "Mausolean monuments." I do not know a more significant fact in the history of English sculpture than that Nicholas Stone, whose father was employed in the stone quarries near Exeter, sent his promising son to be apprentice in a Holborn studio about 1600; half a century before it would have been a local master who would have had the training of him.

And this brings us to the question, which as yet cannot be fully answered. What manner of men were these sculptors? So far as I can ascertain from signatures and agreements, notes in State papers and the like, they fall into three classes. There were the Englishmen, who belonged to the Masons' Company (earlier the Marblers), who had been apprenticed to men who were masons before them, and obtained the freedom of their Company. They sometimes wrote themselves Esquire in formal documents; they often founded family businesses going on for two or three generations; or, if there were no sculptor-heir, a trusted foreman might take over the concern, as Cibber seems to have taken over John Stone's, Quellin John Nost's, marrying his widow into the bargain, Scheemaker Francis

Sir John Kyrle. Much Marcle, Herefordshire.
By unknown sculptor (1655).

Charles I (removed from the Second Royal Exchange). Central Criminal Courts By John Bushnell (1671).

Richard Sherburne. Milton, Yorks. By William Stanton (1699)

Plumiere's, and we are expressly told by Vertue that it was a great advantage to Bird that his father-in-law was a Mason.

The second class consisted of foreigners who settled here and became members of the Masons' Company, sometimes working with other masons. We possess the agreement in which Nicholas Johnson of Southwark, whose father (who originally spelt his name Janssen), had founded the studio, agrees to work with young Nicholas Stone on the monument to Thomas Sutton in the Charterhouse. The third class consisted of foreigners who settled here, like le Sueur and Fanelli, on the strength of Court favour, and had, it would seem, no connection with the traditional organisation of the craft.

By the irony of fate, it is those foreigners who, as a rule, are remembered, while the Englishmen are totally forgotten. It is a staggering fact that there were 160 Masters of the Masons' Company between 1620 and 1820 (for some of them held office two and even three times), and that we know works by only 34 of them; of these nearly 30 will not be found in any Dictionary of Artists; one knows them only from signatures casually noted. And these men were the heads of their profession! What hope is there then, save by the discovery of documents relating to them, or to their works, or of signatures upon existing monuments, of finding out what the other Masons were and what they were doing ? For they were assuredly at work all the time, even during the Commonwealth, when monumental art was almost at a standstill, officers of the Company went on being elected, and down to the accession of George I the Masons were incomparably the most important body of sculptors in the country.

But the influx of foreign talent was too much for them. Cibber and Gibbons had less patronage than Bushnell and the Stantons, but Rysbrack Scheemaker and Roubiliac were found both new and exciting; and the Mason sank by degrees into the mason in the modern sense. When a past Master of the Masons' Company, Robert Taylor, got the carving of the pediment of the Mansion House for his son against such competitors as the sculptors just named, it was frankly called a job. Englishmen like the younger Stone and John Bushnell had gone abroad after their apprenticeship here ; Bird was trained abroad, but as we have seen, found his father-in-law's status as a Mason invaluable when he set up in London in the 1690's ; but it cannot be an accident that after 1714 there are very few, after 1730 no first-class monuments by English-trained sculptors until we come to the triumphs of John Bacon, R.A., in the 1770's—and he was not trained as a sculptor at all, but taught himself.

It is the work of these forgotten Englishmen, or of those who settled in England and set up yards or workshops on traditional lines that I shall chiefly show you to-night ; though the eighteenth century would be misrepresented, indeed, were we to omit the great foreigners who settled here in their youth and rank as English sculptors. We will begin with a work by a nameless London man, which shows the traditional recumbent posture combined with a delicate realism that recalls a Holbein drawing. One of the most notable changes we have to record is that from the rigid, recumbent attitude of tradition to the figure kneeling, sitting, or reclining on the elbow, the latter being satirised by John Webster in the *Duchess of Malsi* :--

Duchess : What, do we grow fantastical in our deathbeds ?
Do we affect fashion in the grave ?
Most ambitiously. Princes' images on their tombs
Do not lie as they were wont, gazing on heaven,
But with their hands under their cheeks, as if
They died o' the toothache, they are no longer fashioned
With their eyes fixed upon the stars, but as
Their minds were wholly bent upon the world,
The selfsame way they seem to turn their faces.

But I must not end upon this note. Even in the *Anecdotes of Painting*, where he had few opportunities, indeed, Horace Walpole, whom, as the preserver of the Vertue MSS, I am especially bound to praise, did not forget his mission as the Apostle of Gothic to his own generation. Gothic building, Gothic sculpture, was misunderstood because despised, when the sculpture which we have been considering was both intelligible and popular. Gothic art to-day needs no vindication; it is the later art which stands in need of explanation. Therefore, it is that his words *mutatis mutandis* are memorable now. If we look at their works without prejudice, we shall find that the persons who made them had more taste, more genius and more capacity than we choose to allow. It is that verdict which I would ask you to endorse to-night.

DISCUSSION.

The Chairman said that Mrs. Esdaile had brought forward a great many facts of which many of those present must have been unaware, and had possibly started trains of thought in their minds which they would like to develop. He invited questions from the audience.

A Member of the Audience asked why the Roman costume was so frequently used on the monuments instead of the ordinary costume of the day.

Mrs. Esdaile replied that the answer to that question was, frankly, that it was a matter of convention. It would be remembered that in France Louis Quatorze was arrayed in the guise of a Roman emperor, and the convention was imitated in this country. It was used not only for sovereigns, but for others also. One had sometimes the central figure depicted with the Roman costume, while surrounding figures were arrayed in the costume of the period. The periwig was used with the Roman costume because portraiture of an exact order had to be combined with the convention. Therefore, the head, in order to be true to the portraiture of the time, had to be shown wearing either a periwig or a nightcap. The nightcap convention, obviously, would not do, and therefore the periwig had to be combined with the Roman costume if one was to get a life-like head. This was a real convention not only in sculpture, but in painting and even in poetry, for it would be remembered that Pope addressed George II as Caesar. Frescoes were found in which exactly the same convention was employed. When a thing was so widespread one must take it that it really represented the spirit of the time. It was quite unlike that neo-Hellenism of Banks's monument to Mrs. Petrie, which was pure affectation.

Mr. W. W. Clinton said that it was interesting to note that John Bacon, the sculptor, to whom the lecturer had referred, was one who received the Society of Arts Gold Medal. The full story of his attainments was set out in the *History of the Royal Society of Arts*, by Sir Henry Trueman Wood. He read the paragraph as follows :—

> "Bacon, John. Premium in 1759 (aged 18), for a figure of Peace; subsequent awards were made to him in 1760, 1761, 1764, (2) 1765, 1772, 1774, 1776, 1777 and 1778, all for casts or models. In 1778 he was also presented with the Gold Medal in recognition of his gift to the Society of the statues of Mars and Venus. An engraving of his Mars, by Bartolozzi, is prefixed to Vol. 5 of the Transactions, and one of his Venus to Vol. 7."

Bacon carried out much important work, and died in 1799.

The Chairman said that he was sure the members would wish to express their very hearty thanks to Mrs. Esdaile for this extremely interesting and to him most informing lecture. What she had brought out that evening was a point that certainly he himself had not thoroughly appreciated, that one was rather inclined to look upon these 17th and 18th century sculptures as products of an age of affectation. It was possible to take it in that way, because it did happen that on certain occasions the spirit of the sculptor had rather outrun his powers. He tried for a very vivid impression and missed his mark, laying his work open to criticism, and at times to ridicule. But it must be put to the credit of these men that they were trying their best to be perfectly honest in their representations, and moreover, they were trying to represent the sentiments appropriate to moderns in a way that former ages had never attempted. They considered that representations of the living figures, acting a part which the people themselves might have acted in their own lives, were perfectly appropriate for placing over their graves. This generation had always been brought up to think of a church as a place of rest, and when, after a period during which effigies had always been shown in a recumbent position, the figures were represented sitting or standing, one felt that a false start had been made. But the honest feeling of these sculptors must be respected, and they represented a school of art which should have more attention than it had received. The lecture had also shown how much could be done by careful and thorough-going research as to authorship. It added enormously to one's interest in a work of art if one could trace the hand of a particular sculptor or a school of sculpture through their works. To identify the work as belonging to one man helped to an understanding of its purpose and its execution. He called upon the meeting to accord a hearty vote of thanks to the lecturer for a most excellent discourse.

The vote of thanks having been carried unanimously, and briefly acknowledged by Mrs. Esdaile, the meeting then terminated.

CORRESPONDENCE

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MODERN STREET ARCHITECTURE.

Sir James Simpson's letter comes appositely.

We are, as he says, creating slums in London of a new type with the barrack-building of the moment.

But unless the Society gets to work quickly with a special commission (*not* a "Royal Commission," which never gets anywhere !), to take the matter up *nationally* and force it upon the attention of the nation through Parliament, this will be another battle for beauty lost.

Mr. Morley Horder has made his *beau geste*—one that for twenty-four hours (quite a long time in these days) caught the national attention. Do not leave him up against the guns alone !

SHAW DESMOND.

NOTES ON BOOKS

INDUSTRIAL ARBITRATION IN GREAT BRITAIN. By Lord Amulree, G.B.E., K.C., late President of the Industrial Court. Oxford University Press. London: Humphrey Milford. 12*s*. 6*d*. net.

Lord Amulree has composed a very useful volume on the various developments of arbitration and conciliation in Great Britain.

The first 120 pages are devoted to history prior to the War, culminating in the establishment in 1914 of the Committee of Production, with Sir George (now Lord) Askwith as Chairman ; Sir Francis Hopwood (now Lord Southborough) representing the Admiralty ; Sir George Gibb representing the War Office, and Mr. H. J. Wilson as Secretary, and the following 82 pages to the history of arbitration during the War and since its close, and the foundation of the Industrial Court, over which Lord Amulree then presided.

The work purposes to treat of " one phase of our industrial life which might well receive fuller treatment than could well be accorded to it in the excellent but more general works of such writers as S. and B. Webb, J. L. and Barbara Hammond, and Lord Askwith, to say nothing of the still more classical Cunningham and Thorold Rogers."

The author states rightly that, in his view, " it is essential that a person called upon to arbitrate should possess certain qualities, such as industrial knowledge, patience, and impartiality; it is also an advantage to have that philosophic background which comes of acquaintance with the history of this and cognate methods of settling industrial differences " : and cites the analogy that " the rules of the Common Law were not enunciated overnight ; they were a matter of slow growth and of much thought and experience," and he hopes that " in the fulness of time the Industrial Court, as a continuing tribunal, may build up a body of rules of similar value and purpose, for guidance in that field of industrial relationships which lies between private ethics on the one hand and law on the other."

Very early history speaks of the Statute of Labourers of 1349, and the various efforts made by our ancestors to deal with times of crisis. In many points there is a strange similarity with events of the present day, showing the difficulty in the fluctuating periods of prosperity or want, of large supply and diminishing demand, or large demand and diminishing supply. In the times of Queen Elizabeth the Justices of the Peace had much work in assessment of wages, and were heavily fined if they did not attend for assessment, and in an Act of 1603 it was enacted that, if any clothier or other should not pay so much, or so great wages, to their weavers, spinners, workmen or workwomen, as shall be set down, rated and appointed, they shall be fined—almost an anticipation of the Trade Boards Act.

So the attempt by the State to regulate the increasingly diverse economic life of the country resulted in a mass of irritating and contradictory legislation that was either ignored or enforced merely to satisfy particular and selfish interests—almost an anticipation of D.O.R.A.

In an apprehension lest a combination formed for economic purposes should become political in its aim while directed against a combination of workmen, during the French Revolution measures were taken which were not dissimilar to those taken to meet the General Strike. So, in the suggestion of Pitt that there should be established schools of industry to educate children in such branches of manufacture as they were capable of executing, a forecast of industrial schools was shown. And were not the Acts first passed to deal with the technical disputes of the cotton operatives a forecast of the many Boards of Conciliation established in other industries, with recourse to an arbitrator as the final result ?

The history has been of slow growth, and laws once made became difficult to change in spite of the alteration in facts. Lord Amulree suggests that the real history of arbitration commenced with the repeal of the Combination Laws in 1824, allowing employers and workmen to meet and confer together on wages, hours and kindred matters, and the history is particularly useful as showing how, over and over again, Commissions and Committees have gone over the ground and ignored the evidence given only a few years before.

Attention is called to the work of Lord St. Leonards on the Act of 1867, a strangely ignored Act of Parliament; the zeal and enthusiasm of Mr. A. J. Mundella, Sir Rupert Kettle, Mr. David Dale and Sir Henry James. Following the London Dock Strike of 1889 and the report of the Royal Commission on Labour of 1894, the exiguous Conciliation Act of 1896 was passed, an Act now incorporated in the Industrial Courts Act of 1919, and it began to be recognised that Trade Unions had come to stay and would form an important feature in the industrial life of the country. It was the first Act of which use had really been made, and on it has been built growing systems of arbitration and conciliation. A particular Government Department now had a definite relationship to industrial affairs and developed a sense of duty in doing what was possible to prevent and heal industrial disputes.

In 1908 panels of arbitrators were established by the Board of Trade, and use made of Courts as well as of single arbitrators.

In 1911 an attempt was made at an Industrial Council, whose chief work was pointing out that the keeping of agreements rested more directly upon moral obligation than on force. Lord Amulree states that gradually the view was established that strikes and lock-outs could be avoided, and belief in arbitration made possible the method of arbitration adopted, or at any rate willingly concurred in, by employers or employees, during the War.

At the beginning of the War the quick reduction of trade disputes is noticed, and the establishment of a form to settle disputes without stoppage of work by strike or lock-out, under the auspices of the Committee on Production. Lord Amulree remarks: "Probably no one at the time realised that the Committee on Production was to become an arbitration tribunal dealing with differences between employers and workers to an extent far beyond what had ever been known before in this or any country."

The Munitions of War Act, the occasional necessity of a proclamation, the number of subsidiary arbitration courts and single arbitrators, the enlargement of the Committee, the famous 12½ per cent. bonus of October, 1917, "a bye-word for the folly of ill-considered interference with wages," are carefully related. The adjustments required by the variations in the cost of living, the National Wages Agreement of the Engineering Employers' Federation, followed by the many other similar agreements in a large number of other trades, and the extension of awards from federated firms to non-federated firms, resulted in the hearing of 3,746 cases between March, 1915, and November, 1918, making, with other forms of arbitration, 7,820 awards of which the decisions of general application had extended far beyond the particular trades for which they were first given.

After the War the Whitley Committee, the National Wages Board, following the model of the Committee on Production, and the Iudustrial Courts Act, 1919, are next mentioned. Lord Amulree, then Sir William Mackenzie, was the first and successful President of the Industrial Court, and sums up his book with the high praise "that the Industrial Court affords a more rational and convenient means of settling differences than has ever heretofore been devised, and that in its practice no less than in its constitution it may be regarded as the consummation of the long period of experiment reviewed in these pages," and with the true statement that "the extent to which these facilities will be used effectively depends upon the strength and genuineness of the will to peace by the parties concerned." That is, in fact, the most important point of all industrial settlements, the will to peace.

MODELLING AND SCULPTURE. By F. J. Glass. London: B. T. Batsford. 10*s*. 6d.

There is at present on a visit in London what was the first large bronze statue to be executed in Europe after a lapse of a thousand years. It is the David of Donatello; it stands in company with a second bronze David, that of Cellini, and with a marble David, the work of Michelangelo.

The event is an important and a moving one. Our metropolis is not rich in statues —from the point of view of quality. We are " rich " enough in poor, pompous and popular stuff. Dalou's little fountain is generally neglected, Epstein's Rima sometimes tarred and feathered. Neither of these types is fertile; on the other hand we find the Albert Memorial races multiplying, and colonising the tympana and friezes of our ponderous new office buildings. From time to time we come across a depressed and depressing giant claiming descent from the titans of Michelangelo, but what degeneration! What a loss of grace and vitality!

I think there is absolutely no doubt that if Donatello could have sent in a design for the Haig statue it would have been condemned by national opinion even if passed by the judges. Impenetrable crowds may hem in the David; but in the case I am supposing we should soon have all the correspondence columns flooded with letters from outraged sportsmen, pointing out that we might have known from the way Donatello adjusted the horse's tail on the Gattemelata memorial that he was unfitted for his task. And the sportsmen would carry the day.

Now the demand for statues, though it may be, as Mr. Glass says, more diverse than one might at first have imagined, is almost more dependent, so to speak, on the popular taste than is the demand for other artistic productions. Symbolic figures and groups, memorials, and so on, are put up for the public, seldom for the connoisseur. The minority of " highbrows " can sometimes enable a sincere painter to remain true to himself and yet survive; they can sometimes obtain for an intellectual book quite a respectable circulation. But how often are they going to band together for the erection of a statue?

There is no aspect of art for the understanding of which the popular taste more needs educating. Mr. Glass is to be praised for adding to his technical instruction a chapter on the history of sculpture, which he has illustrated with examples from all ages. Meanwhile let our public correct its taste for the Gothic and literal by learning to appreciate that Classic feeling for the suave and the beautiful which is so well exemplified just now at Burlington House.

BRITISH HARDWOODS: their Structure and Identification. By L. Chalk, M.A., D.Phil., and R. J. Rendle, B.Sc., A.R.C.S. Obtainable from H.M. Stationery Office, Adastral House, Kingsbury, London, W.C.2. 5s. net.

This book was published under the authority of His Majesty's Stationery Office, as Forest Products Research Bulletin, No. 3, for the Department of Scientific and Industrial Research and the Imperial Forestry Institute. It was prepared by Dr. L. Chalk, of the Imperial Forestry Institute, Oxford, and Mr. B. J. Rendle, B.Sc., of the Forest Products Laboratory, as a guide to the identification of British Hardwoods, and the authors have succeeded very well in their effort. The book commences with a general introduction wherein wood structure is described and attention is directed to the principal features observable in microscopical examination, or by the use of a pocket lens, such as the presence or absence of vessels or pores, the arrangement and sizes of vessels, the contrast between spring and summer wood in the annual rings, the difference between heartwood and sapwood, the size and character of the rays, and so on. A series of photomicrographs illustrate the points in question and the respective arrangement of the more definite features in six different kinds of wood. Following the introduction, clear and easily understood descriptions are given of all the British Hardwoods that are likely to be met with in general practice, and each description is accompanied by a full page photomicrograph of the wood. To contrast with home-grown woods a series of smaller photomicrographs and short descriptions of certain exotic woods are also given. The authors are to be congratulated upon the excellence of their work, which is clear and concise, with a notable absence of technical terms which are often such a stumbling block to the practical timber man. The book can with confidence be recommended to all who are interested in trees and timber. The printers and publishers have also done their work well, and the modest price of 5s. places it within everyone's reach.

W.D.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY, MARCH 31..Actuaries, Institute of, Staple Inn Hall, Holborn, W.C. 5 p.m. Mr. C. F. Wood, "Experiments in Modified forms of Select Mortality Tables."

Carpenters, Worshipful Company of, Carpenters' Hall, Throgmorton Avenue, E.C. 8 p.m. Mr. Arthur Keen, "Charing Cross Bridge."

Electrical Engineers, Institution of, at the University, Birmingham, 7 p.m. Dr. Bernard Leggett, "The Medical and Surgical Applications of Electricity."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Discussion on "Loud-Speakers," opened by Captain P. P. Eckersley.

Farmers' Club, at the Royal United Service Institution, Whitehall, S.W. 4 p.m. Messrs. S. T. Johnson and F. Rayns, "The Feeding of Sugar Beet By-Products."

TUESDAY, APRIL 1..Automobile Engineers, Institution of, at the Royal Society of Arts, Adelphi, W.C. 7.30 p.m. (1) Captain J. S. Irving, "The Golden Arrow and the World's Speed Record." (2) Messrs. J. H. Hyde and Dr. F. Aughtie, "Measurements made of the Tower and Efficiency of a Motor Lorry Gear Box."

Electrical Engineers, Institution of, at the Engineers' Club, Manchester. 7 p.m. Messrs. H. A. Humphrey, D. M. Buist and J. W. Bansall, "The Imperial Chemical Industries Limited's Steam and Electric Power Plant at Billingham."

Photographic Society, 35 Russell Square, W.C. 7 p.m. Mr. H. Pickwell, "The Pilgrims' Way through Surrey."

Royal Institution, 21 Albemarle Street, W. 5.15 p.m. Dr. Charles Singer, "The Scientific Crux."

Zoological Society, Regents Park, N.W. 5.30 p.m. Scientific Business Meeting.

WEDNESDAY, APRIL 2..Analysts, Society of Public, at Burlington House, Piccadilly, W. 8 p.m. (1) Prof. M. Eldin Bey, "The Detection and Identification of Alkaloids in the Saliva and Salivary Glands. (2) Ella M. Collin, "The Separation of Cadmium and Copper in Spelter and Zinc Ores by Internal Electrolysis." (3) Mr. A. F. Lerrigo, "The Routine Detection of Nitrites in Milk." (4) Dr. J. C. Ghosh, "A Method for the Determination of Titanium as Phosphate."

African Society, at the Royal Society of Arts, Adelphi, W.C. 5 p.m. Colonel H. L. Crosthwait, "Aerial Survey of East and Central African Territories."

Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Students' Meeting. Mr. J. L. North, "Notes on Electric Traction in England."

Electrical Engineers, Institution of, Savoy Place, W.C. 6 p.m. Wireless Section Meeting. Mr. R. H. Barfield, "Recent Developments in Direction Finding Apparatus."

Electrical Engineers, Institution of, at the Cleveland Technical Institute, Middlesbrough. 7 p.m. Annual General Meeting. 7.30 p.m. Mr. L. C. Grant, "The Breaking Performance of High-Power Switchgear and of a new form of Quenched-Arc Switch."

THURSDAY, APRIL 3..Auctioneers and Estate Agents Institute, 29 Lincolns Inn Fields, W.C. 7.30 p.m. Mr. H. Mordaunt Rogers, "The Making of a Connoisseur."

Aeronautical Society, at the Royal Society of Arts, Adelphi, W.C. 6.30 p.m. Monsieur P. Grimault, "Operation of the Aero-Postale Service in Europe."

Chemical Engineers, Institution of, at St. Ermins, Caxton Street, Westminster, S.W. 3 p.m. Dr. J. T. Dunn and Dr. Burrows Moore, "Pulverised Fuel."

Chemical Society, Burlington House, W. 8 p.m. (1) Messrs. C. S. Gibson, A. R. Penfold and J. L. Simonsen, "The Essential Oil of *Backhousia Angustifolia*. Part II: The Isolation of naturally occurring β-Diketones; Angustione and Dehydroangustione." (2) (Miss) F. M. Hamer, "Attempts to Prepare Cyanine Dyes from Quaternary Salts of 2-Methylacenaphthpyridine and of Ms-methylacridine." (3) Messrs. C. S. Gibson, E. S. Hiscocks, J. D. A. Johnson and J. L. Jones, "10-Chloro-5:10: Dihydrophenarsazine and its Derivatives. Part XII: Absorption Spectra." (4) Messrs. R. W. Aldis and J. C. Philip, "The Production of Fog in the Neutralisation of Alkali with Hydrogen Halides. Part II: The Significance of the Presence of Ammonia."

Linnean Society, Burlington House, W. 5 p.m.

Mechanical Engineers, Institution of, at the Engineers' Club, Manchester. 7.15 p.m. Mr. John Dearden, "Compressed Air and its Uses."

Philological Society, at University College, Gower Street, W.C.

Royal Institution, 21 Albemarle Street, W. 5.15 p.m.

FRIDAY, APRIL 4 .Chemical Engineers, Institution of, at the Hotel Victoria, Northumberland Avenue, W.C. 11.30 a.m. Annual Corporate Meeting. 12.15 p.m. Mr. J. Arthur Reavell, Presidential Address, "The Role of Science in Industry." 2.15 p.m. Mr. H. Tongue, "The High Pressure Equipment of the Chemical Research Laboratory, Teddington."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Messrs. E. H. Rayner, W. G. Standring, R. Davis, and G. W. Bowdler, "Studies in Low-Power-Factor Measurements at High Voltages."

Geologists' Association, at University College, Gower Street, W.C. 7.30 p.m. (1) Mr. A. L. Leach, "Geological Structure and British Coastal Scenery." (2) Messrs. A. L. Leach and A. C. Young, "On a Section in R. Ravensbourne Valley Gravels at Lewisham." (3) Mr. A. L. Leach, "Recent Excavations in the Shooter's Hill Gravel."

Junior Institution of Engineers, 39 Victoria Street, S.W. 7.30 p.m. Informal Meeting. Mr. W. M. Hurrell, "Visits to Iceland and Other Places."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 7 p.m. Informal Meeting. Discussion on "Smoke," opend by Mr. A. Lennox Stanton.

North-East Coast Institution of Engineers and Shipbuilders, at the Mining Institute, Newcastle-on-Tyne. 6 p.m. Mr. A. Read, "Electrical Deck Auxiliaries."

Photographic Society, 35 Russell Square, W.C. 7 p.m. Informal Meeting of the Pictorial Group.

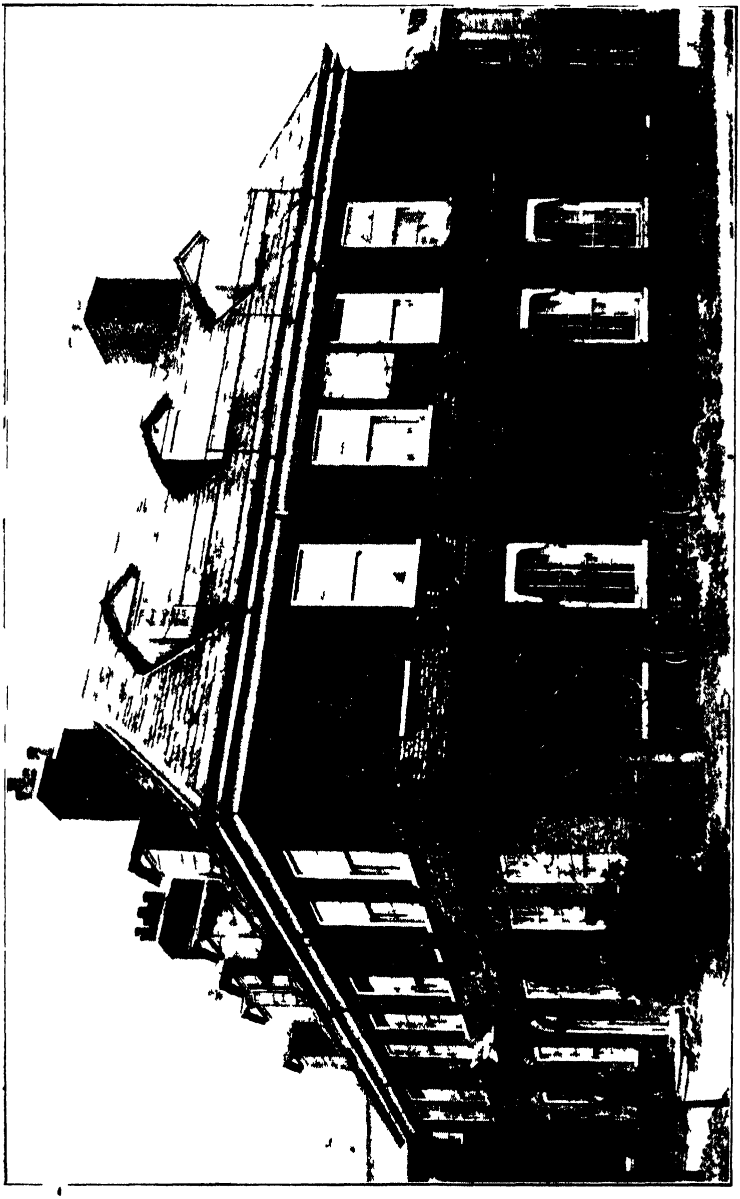
JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4037 *FRIDAY, APRIL 4th,* 1930 VOL. LXXVIII

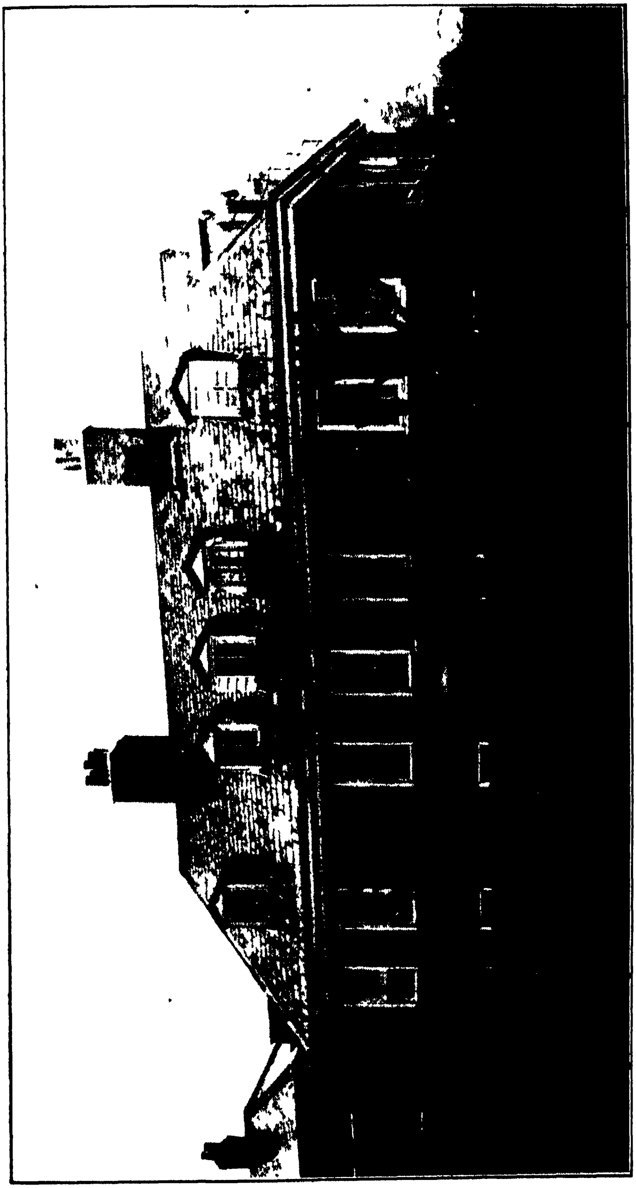
All Communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

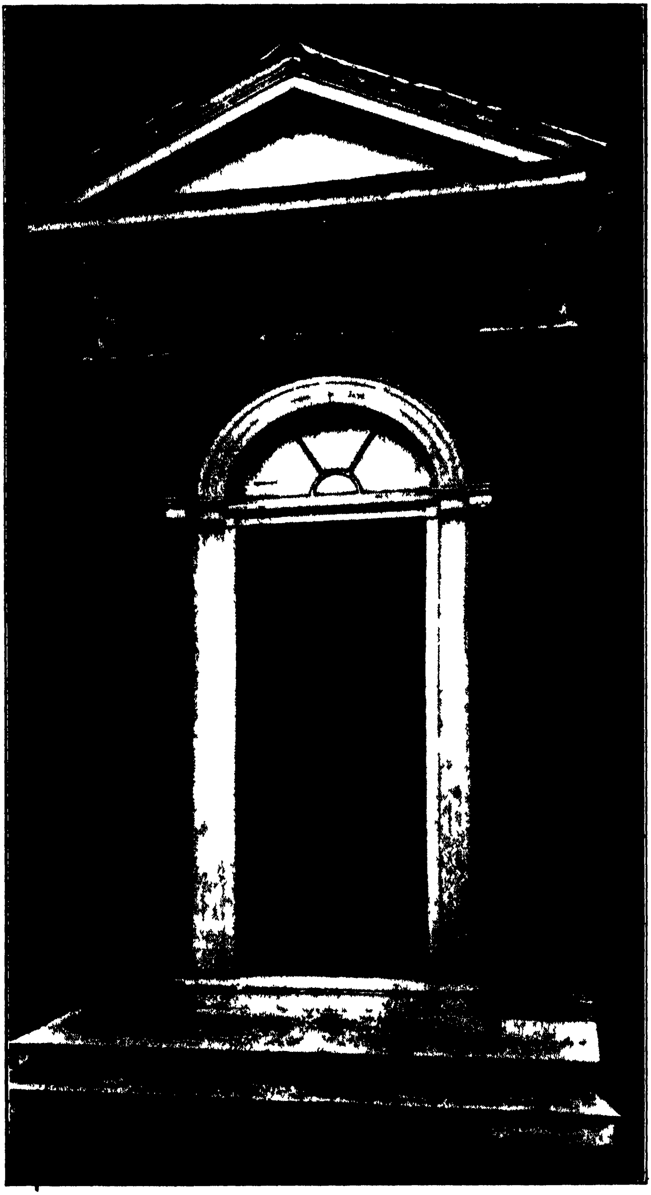
Battersea.– The announcement in the press that a house, reputed to be by Sir Christopher Wren, on the riverside of Battersea, was to be demolished, seemed to this Society incredible and worth immediate investigation. Turning over the six volumes of the Wren Society's publications (to which we referred in our last issue), we see no reference to this so far, but a visit to St. John's College, Vicarage Road, revealed a very characteristic house in the grand manner of Wren In the late Victorian years various irresponsible buildings have attached themselves to this house. Whether the buildings as a whole are suitable for scholastic purposes is questionable; they certainly have no value as examples of the art of building. Battersea now has an opportunity to release this very beautiful house from its Victorian entanglements and put it in repair for some purposes of real education. The idea that the Battersea Borough Council is proposing to clear the site and with it this building is, we are sure, incorrect. It would not only be a crime, but very bad business. We feel sure, too, that the Society for the Propagation of Christian Knowledge would not have sold the buildings without a proviso that the house should remain intact. Such an idea is unthinkable. A very considerable area of land which was purchased with the buildings by the Council for £33,000, can be developed for most delightful tenements with this authentic house to give the scheme real character. Here is a rare opportunity to group proportionately with this house flats built in the same simple manner, and leaving a space for a pleasant garden. Battersea, with all its drab, poverty-stricken houses, is redeemed by its lovely park and its access to the Thames. With some vision the slums of Battersea might be relieved if this little corner of its boundaries could be made worthy of so fine a house. Some purposes of education could surely be served by keeping the house and its noble rooms for exhibitions of industrial art or other activities connected with education. It is no good keeping the house if the



The House from within the garden without its 19th century accretions



The House as seen from the river side over the boundary wall.



One of the two fine doors

The Dial on the house

buildings which are to surround it are not standardised with the same perfection as Wren understood this art. The Battersea Borough Council, we are sure, does not need the pressure of any Society to realise their opportunity; they cannot afford to destroy the most valuable item in their purchase. If they appreciate their responsibility to the community, they will not only keep the house but see that the noble staircase and the panelled rooms are put back to their original condition. The report that the Council do not see their way to retain the buildings on the site, of course refers only to the negligible accretions. They are, no doubt, being advised professionally, and no architect of any standing would be responsible for removing this interesting eighteenth century house. The other fine house, with its beautiful iron gates, is a very worthy neighbour, and should be observed by anyone going to see St. John's College.

The Countryman and the Cotswolds.—We congratulate *The Countryman* on its third birthday number of 192 pages. It is full of interesting matter and, such is its prosperity, full of advertisements, which are introduced into the letterpress in a very pleasant manner. As this is a quarterly, and we are a weekly, there will be an opportunity of referring to one or two very interesting subjects discussed therein. This week we should like to draw attention to the very interesting experiment in building which has been made by the enthusiasm of a Fellow of this Society. As *The Countryman* says, Mr. Cripps has done a public service to the Cotswolds by his experiment with his village of Filkins. There is no further excuse for any unpleasant buildings in this district. We cannot do better than quote Mr. Robertson Scott's (the Editor's) comments, which he heads " As One Countryman to Another."

> "Many of our readers would like to hear particulars of the praiseworthy effort which the well-known K.C., the Hon. Stafford Cripps, has made at Filkins for the preservation of Rural England. Simultaneously with the work at his own house, he has been restoring old cottages in the village, and has now gone on to show the Rural District Council—and we hope other Rural District Councils—how a landowner may co-operate, in a spirit of local patriotism, with his local authorities. We have twice visited the new District Council Cottages that Mr. Cripps' foreman mason, and the foreman mason's father and other sound workers, have built, and there is substance in their boast that, except for the renewal of distemper and repainting of doors and gutters, it is unlikely that much or anything will need to be done to the structure for a century. The cost of repairs first and last on many, if not most, of the ordinary type of District Council Cottages, must be heavy, and it is a point to which unenlightened Housing Committees, with their cheese-paring methods, are blind. The chief fact we have to lay hold of is that, with quarries at hand, building in stone is not dearer than building in brick. Another fact is that if good work in stone is not forthcoming, good masons will soon be very scarce indeed. Young men are not going into the trade as they used to do."

It is a matter for congratulation to this Society that one of its Fellows has provided an opportunity, which will hardly be lost, of solving so important a question, namely, the building of cottages in materials that contribute so largely to the beauty of the district. The problem of producing inoffensive housing is really a question of educated intelligence. There are certain fundamental forms in every district, which are largely controlled by the local and natural materials. You cannot standardise your plan, as this has to be varied to suit each site, and the contours of the land. The District Councils have, as a rule, three different stereotyped plans of houses and they are made to fit the varying conditions of the villages. This standardisation of plan seems to have unfortunate results. The problem is to perfect the details for complete standardisation in a district—doors, windows, etc. The standardisation by firms of such things as iron windows is fatal. The type becomes too universal and rigid. You can standardise a village but not a county. The complete organisation of labour and materials on a group of cottages with standardisation of all the details is the only way to get the most economic results. We are not sure whether the only solution is the employment of direct labour under a really competent foreman with sound knowledge of building and sympathetic control of men. The problem is not really an architectural one, but of the use of sound natural material expressed in the proportionate forms that have become satisfying to the district. One recalls the unpleasant hot red bricks that do not seem right in Cambridge, when there is a local clay on the border that lends itself perfectly if rightly used to building there. In Somerset the gray slates so familiar on old buildings are now never used, but Welsh slates are imported or Staffordshire tiles. At Treborough, near Minehead, there is a wonderful quarry of beautiful thick grey slate, which only needs the equipment of a Welsh quarry to make the manipulation and transport locally a business proposition. Everywhere the right materials seem to be expensive from lack of business enterprise, and whole districts are ruined in consequence. Could there be a better exhibition of bad business for a country whose beauty is one of its greatest assets ?

Advertising. -The following is from an address to the National Advertising Society. His Royal Highness Prince George (who was the guest of honour) said :—

> " What exactly is advertising ? What does it do ? How does it do it ? My mind therefore sought some symbol and this came to me when driving down the Mall. Suddenly I noticed a tall building emerge from the darkness into brilliant illumination. That building now stood clearly revealed by what I believe is called ' flood lighting.' That is what you gentlemen seem to me to be engaged upon—flood lighting the work and services of man so that each article is better known, better seen, and more keenly desired." (Cheers.)
>
> " My first impression from this thought was the importance of truth in advertising, for it would be useless to turn a ' flood light ' on to any article which cannot stand this searching test. At the same time, it is obvious that any article that stands this test must be a good one, and a credit to the maker who recommends it and whose name it bears."

Pylons and the Countryside. -Propaganda against pylons and posters has assumed quite large proportions of late, as though these things were ultimately to determine our destiny as a nation. One detects an almost religious fanaticism in the zeal which is being applied by certain societies and individuals to obstruct, delay, or entirely prevent the intrusion of these emblems of our modern industrialism upon our peaceful and pastoral rural background.

To preserve the beautiful in Nature is indeed a noble object and I, for one, cast no doubt on the purity of the passion of the organisation and societies which exist for the preservation of our natural beauty spots. But I confess to a measure of intolerance for those who hide behind these societies and egg them on to action merely to preserve, protect, or enhance the value of a particular beauty spot with a wide-open eye on possible market values.

Sculpture. We quote from a very interesting address given by Mr. Eric Gill to the members of the Architectural Association :—

> " Good style in sculpture was the combination of subject and object. Thus a sculptured figure of a man or of a tortoise must be clearly a man or a tortoise. But a man or a tortoise sculptured in stone must be equally clearly a stone man or a stone tortoise. The kings and queens on the west porch of Chartres were no less kings and queens because they were made as God would have made kings and queens had he made them in stone."

Art. —*Bloomsbury Gallery.* There is always something interesting and new to be seen at this Gallery, run by Miss Joan Druce and Dr. Stanislaus Osiakovski. First and foremost there are pictures, very often by young foreign artists and then a delightful permanent exhibition of unusual pottery and books and all manner of delightful drawings and prints. It is well worth a visit for this alone, for this little gallery has a real atmosphere and personality, very unlike the ordinary show where there is a collection of pictures and a catalogue, a bored secretary at a desk and nothing more.

The actual picture exhibition now being held is of work by a young artist, Emmanuel Levy. In contrast to what we considered a very disappointing exhibition of young art at the New Burlington Gallery, it is interesting to see these very striking modern pictures by a young man which really seem to have something to say. His style is direct and very simple, but he gets there without any of the tricks or affectations of some of the young moderns and his drawing and sense of colour are excellent. This is a little exhibition well worth seeing by anyone interested in the art of to-day. One or two of the portraits are the best, though he keeps rather strictly both in portraits and drawings to one type of sitter. "The Mourner" is an interesting forcible study in a more impressionistic manner.

The Cotswold Gallery is holding an annual exhibition of engravings by Turner, mainly those of the famous "England and Wales" series. This little gallery is a delightful setting for these beautiful engravings, which have a rare loveliness of line and are made doubly interesting by comments written on some of the early impressions in Turner's own hand, giving directions and ideas to the engraver; in some he has also drawn in pencil and altered the outline or added some extra touch. Delicate engraving of this sort is almost a lost art nowadays. It belongs to the time when the atmosphere was more conducive to this laborious and detailed line work, when the countryside was quiet and lovely with a cottage here and there and hills and villages untouched by high speed cars and tin huts and petrol pumps – only a lino cut could do justice to a petrol pump. Some of the larger engravings also are magnificent in their beauty and detail, such as "The Approach to Venice," and "Dido and Æneas."

Industrial Art.—*Handworkers' Gallery.* Mr. Bernard Leach's pottery is the sort of thing we should recommend to anyone who was furnishing or decorating a country cottage, or in fact a mansion, for there are some beautiful show pieces which need a fine setting. But the appeal of this pottery is not only in its suitability but in a real quality and colour. These exhibitions are especially valuable against the tide of machine-made goods which flood the market. Not that we are averse to this, for the day of the craftsman, except in exceptional circumstances, is over, but it is the artist craftsman who has to set the standard for the machine, and if we are to have a modern style of furniture and pottery we cannot leave this entirely to the mass production merchant. Apart from the ornamental pots, some of which are very good indeed, the smaller things such as cups and dishes seemed peculiarly suited to the modern cottage and modern requirements. We should like to see a large exhibition of modern pottery on these lines which might have a real influence in this direction. Here is the argument for an industrial art gallery.

Industrial and commercial art is becoming increasingly important and another pioneer in this direction is Heal's, in Tottenham Court Road. However, much we may quarrel with individual pieces of furniture and pottery, we must recognise that Heal's have for years been doing most excellent work in modern decoration. They are continually enlarging and altering and can hold their own as distinct from any other furniture shop. For beauty of arrangement and idea there is nothing like it in London. In fact, Heal's is not a shop but rather a delightful gallery, and I suppose it has done more to keep modern simplicity and beauty in furniture and decoration than anywhere else. Almost every other firm is still making copies of old furniture or turning out nondescript suites of mediocre design, but whatever you disagree with at Heal's, they do keep modern requirements in view and produce simple, beautifully made furniture without harking back to previous centuries. They give us 1930 furniture and china and glass, and most of it is very good both in colour and design.

Drama.—The Stage Society's production of "Socrates" last Sunday and Monday at the Prince of Wales' Theatre, was a very notable one. These are not the days of thoughtful plays; we live in an age of quick effects, violent drama, crooks and sex appeal, and into the midst of this strident throng comes occasionally a play which makes us think and wonder: such a one was Mr. Clifford Bax's version of Socrates. Being an ignorant outsider and not too conversant with the philosopher and Plato, we cannot criticise it except as a play (which is really the only way it should be criticised). Mr. Bax made Socrates a wonderful character, and Mr. Lewis Casson turned him into a human being. The discourses were admirably chosen, never too long, and a revelation for those who had not heard them before. But the play was never forgotten, and there was just that touch of humour and humanity which made the death scene into a living thing, and very poignant instead of just a final incident (as it might easily have been) after all the long arguments in the last act. The large audience gave the play the immense reception it deserved. It was a great evening not easily forgotten, and a triumph for Mr. Clifford Bax and Mr. Casson. It seems a great pity that we should not see one or two more special performances of this in London; we are sure they would be justified after the appreciation and the excellent notices the play has had.

Books.—"A Woman of Andros," by Thornton Wilder, is slightly disappointing after the curious mystical beauty of "The Angel that Troubled the Waters," which we consider a more interesting book than his famous novel "The Bridge of San Luis Rey." He has a simplicity and a purity of style which often deludes the reader into thinking he has said something very wonderful, whereas in reality it is the way it is said which is wonderful. This is a story of ancient Greece, the beautiful setting of which is excellent material for Mr. Wilder's power of

PROCEEDINGS OF THE SOCIETY

SIXTEENTH ORDINARY MEETING

DR. MANN LECTURE

WEDNESDAY, 12TH MARCH, 1930

SIR OLIVER J. LODGE, D.Sc., LL.D., F.R.S., in the Chair

THE CHAIRMAN, in introducing the lecturer, said that Professor Elliot Smith was well known as a great anthropologist. He probably knew more about the brain than anybody present, and certainly more than he did himself, so he was not going to say anything at all till the Professor had instructed his audience.

The following lecture was then delivered :—

THE HUMAN BRAIN

By G. ELLIOT SMITH, M.D., Litt.D., D.Sc., F.R.S.,
Professor of Anatomy, University College, London

Man is distinguished from all other living creatures by the quality and range of his intellect, and, obviously, therefore, it has been a matter of great interest to biologists during the last century to try and discover what are the distinctive characters of the human brain which confer upon man his unique distinction.

From the time of the Greeks onwards men have been speculating as to the nature of the intellect and the qualities of his body which confer the human rank upon man. If one were dealing with this subject in a purely historical way scores of interesting speculations might be discussed, which have been made through the centuries in the attempt to solve the problem of man's outstanding distinction.

The history of serious investigation of this issue, however, concerns recent decades only. A century ago Gall gained notoriety because he was associated with a crude theory of localisation of the brain's function, afterwards known as Phrenology, but he achieved real distinction by destroying the old traditional views of the nature and functions of the brain and starting modern research on truer lines, which had a large part in leading to our modern knowledge.

It may seem incredible that no less than a century ago the leading authorities upon the anatomy and physiology of the brain seriously believed the important feature of the central nervous system was the cerebro-spinal fluid in the cavities of the brain. What we now know to be the vitally significant nervous tissues were then regarded merely as glands that secreted the fluid which was considered to be the mind-stuff. Gall has not yet received adequate recognition for destroying this myth, which had hampered a true understanding for two thousand years.

Moreover, he established upon right lines the discipline of investigating the nature of the brain.

It was he who for the first time established the fact that the white substance was formed of fibres and the grey matter of the cerebral cortex was the important part of the nervous system. This happened in the early years of the 19th century, and it forms the starting-point of any intelligent attempt to interpret the comparative anatomy of the brain.

Towards the closing years of the 18th century many biologists were beginning to arrange gradations in animal structure leading up to the human family. Hence, when Gall established these fundamental facts concerning the nervous system, comparative Anatomists set to work to try and discover what was the distinguishing feature of the human brain. The experiments of Flourens, the famous French physiologist, suggested that stimulation of the brain afforded no indication of any localisation of function. Much the same sort of results were obtained wherever the electrical stimuli were applied. These results played a large part in neutralising the work Gall had done. In spite of this, however, comparative anatomists continued their work comparing the structure of the brain in vertebrate animals, and set forth various claims for distinctive features, which, so they said, characterised the human brain.

These criteria have since been shown to be based upon errors of observation. The view was put forward that the brain of man possessed a certain diverticulum of the lateral ventricle of the brain, which was said to be absent in other mammals. In those days the belief that the cerebral fluid was the substance of mind had just been destroyed by Gall, but some of the implications of the old myth had not been completely exorcised. Men were still obsessed by the idea that they had to look in the cavities of the brain for distinctive features to account for the mental superiority of man. Thus the view was put forward that man's outstanding quality was the possession of what is called the posterior cornu of the lateral ventricle. This was promptly disproved in 1828, when it was shown that this feature was equally well developed in the apes and certain mammals like seals, and other animals with large brains. The interest of this fallacy is that it represents the first attempt to define in terms of modern knowledge the features of the brain which differentiate man from all other living creatures and provide an explanation of his high powers of intellect.

This erroneous claim was resurrected by Richard Owen the year before Darwin's book, *The Origin of Species*, was published, and was used by him as an argument against the implications of Darwin's theory that man was related to the apes. It became the subject of the liveliest of the controversies in the decade of 1860 to 1870, which was parodied by Charles Kingsley in *The Water Babies*. The false claim was disproved once for all by Huxley, with the help of Flower. Since then anatomists have set up a variety of other criteria as structural distinctions of the human brain. In turn every one of these has been shown to be false.

There is no feature of the human brain which is not also present in the brain of the chimpanzee and the gorilla. Hence it is impossible to claim any particular feature as distinctive of the human brain upon which man's intellectual superiority depends. The question we have to discuss to-night is " What is the difference between the brain of man and the brains of other creatures ? " and it is to that particular issue that I want to direct your attention.

The human brain differs structurally from that of the gorilla in the greater extent of three of the main cortical areas—parietal, frontal and temporal. But the features of both brains are the result of the growing significance of vision.

It must not be assumed that all animals provided with eyes can see in the sense that we understand by that verb.

The eye is primarily an organ for the appreciation of differing degrees of luminosity. It acquired the power of detecting movement—but not until long afterward of appreciating images of the objects that were moving. Then came the ability to recognise form and, in a vague way, distance. But it was not until man's immediate ancestors came into being that stereoscopic powers were acquired.

In any case, the ability to appreciate form represents a relatively high stage of visual development, and the necessary preliminary to discrimination in colour and detail and to a consciousness of depth and position in space—the true realisation of three dimensions.

The attainment of this fuller vision of the world is probably distinctive of man (and in lesser degree of his nearest relatives, the apes). The world and its activities are known to us mainly by the visual experience upon which our intellectual superiority is in the main dependent. By means of our eyes we see the things around us, appreciate their form, their colour and texture ; detect their movements and interpret their meaning ; and guide our hands in acquiring skill and in learning by experimentation. But we also judge the actions and the feelings of our fellows by their gestures and facial expressions. We not only recognise them by their distinctive features and movements, but also appreciate their æsthetic qualities. No one can question the reality of sexual selection in man—a choice determined mainly by visual appreciation of form and colour and facial expression—in particular the ocular element in expression that is so eloquently expressed in the slang expressions of every people.

Man's immediate ancestors became differentiated from other mammals as the result of the enhancement of the importance of vision. Throughout the history of animal life there has been a constant struggle between smell and vision for dominance. In the primitive members of every group of living creatures smell is the sense that exercises the greater influence in controlling behaviour. It not only enables an animal to detect the presence of food, but being closely allied to taste, also gives it a foretaste of its qualities. It also enables it to recognise friends and enemies, to distinguish between sexual mates and sexual rivals. Hence it is the dominant sense in that it controls all the really vital activities of the primitive animal. The influence of smell is limited, however, by the fact that it gives no information as to the position in space or movements of the objects or creatures that the animal scents. Hence smell has to call to its aid the information provided by sight and touch to guide the action it provokes. The influence of vision is thus at first purely secondary, but when the ability to appreciate form is acquired, smell and vision become competitors for the control of behaviour. When vision acquires supremacy in most animal groups, it necessarily involves a type of specialisation that prevents further progress in the direction of enhancement of intelligence. But in mammals vision for the first time acquires a real representation in the cerebral cortex -which hitherto had been essentially an olfactory instrument—so that in such a mammal the enhancement of vision acts as a stimulus to the dominant part of the nervous system (and not to a rival territory of the brain as in other animals). Thus the development of visual control does not involve a specialisation fatal to progress or to the fuller development of other senses and intelligence. Moreover, the increasing influence of vision in the cerebral cortex opens the way for the eyes to control and direct the skilled movements that are regulated by the cerebral cortex. It is not surprising that these vast possibilities are made use of to extend the range and precision of the movements of the eyes themselves, and especially the conjugate movements that involve the intimate correlation of the two eyes. It is only when such movements have attained the necessary range and precision that stereoscopic vision can be attained, and that a definite area in each retina can become highly sensitive for the discrimination of form and detail and the fuller appreciation of colour. Such high powers of vision are found only in the apes and men ; and in the human family, vision has acquired a meaning so vastly greater than even that of the apes that it is no exaggeration to claim that man alone " sees " in the full sense usually associated with that verb.

With the growing importance of vision as an instrument of intelligence, there is also an inevitable enhancement of its unconscious control of behaviour. The complicated mechanisms that automatically regulate posture and movement in most mammals the nature of which has only recently been elucidated by Sherrington, Magnus and their collaborators seem gradually to be superseded in those mammals in which vision is increasing in importance. Especially in man and the apes the eyes, apart from their conscious activities, play quite unwittingly a very important role in controlling posture. One of the results of the operation of this factor is the assumption of the completely erect attitude by man and the freeing of his hands to attain vastly greater possibilities of skill and tactile discrimination. Man is the seeing animal, who has acquired insight and foresight and the wider vision. Incidentally, he attained an æsthetic sense, an appreciation of beauty of form, texture and colour, which has exerted a growing influence on his behaviour and even on the structure of his own body. He began really to examine and admire the forms and expressions of his fellows only when he had acquired the ability really to " see " them.

When one considers the tremendous significance of the eye as the psychological instrument of supreme importance in the attainment of intelligence, it is interesting to study the variations in its structure and function to meet other conditions, in which the mental factor is much less obtrusive if not wholly absent.

DISCUSSION.

Professor E. W. MacBride, F.R.S. (Professor of Zoology, Imperial College of Science and Technology) said that to his mind the lecture had been an exposition of his own particular heresy, which perhaps accounted for the great interest with which he had listened to it. Professor Elliot Smith had made clear the fact that the growth of the brain and of the mind was the result of the growth of habit, and that change of habit, change of activities, was at the bottom of all evolution. That was a conclusion to which he had himself been gradually led, and some years ago he had had reason to hope that the lecturer had reached the same conclusion, and that evening he was glad to see that his hopes had gone into fruition.

There was a celebrated French philosopher, Bergson, who had defined the human reason as a " food-getting mechanism," and if one could imagine a being of a superior sphere, an angel, say, viewing this sublunary sphere and watching this evolution, would he not come to the very same conclusion as he watched the growth of the great central ganglion going on step by step with the increasing complexity of the habits of the animal ? Bergson went on to say that in his opinion this was the cause of the characteristic of the human reason to indulge in materialistic explanation of everything, because since the reason was evolved to deal with material objects, such as flint, stones, and things of that kind, it had an inborn tendency to resort to materialistic explanations. He thought there was a good deal in it.

He was sure he voiced the opinion of all present when he said they had had a most delightful lecture. They had had light thrown on dark and mysterious places in both evolution and anatomy, and many of them would long remember what Professor Elliot Smith had said.

The Chairman (Sir Oliver Lodge) expressed the opinion that he had been asked to take the chair because he was not an expert in the subject of the lecture. But he had been very much interested. At the beginning he was interested to find that Dr. Gall was not simply a sort of heretic and a kind of phrenological quack, as he had heard him described, but that he did really make some good pioneer discoveries and combat that singularly erroneous hypothesis that it was the fluid in the brain that represented the mind, that the mind was something that one could deal with as material, see and handle, and that it could have a purely materialistic explanation. Gall seemed to have discovered the fibres in the brain and soon afterwards the cerebral cortex of the brain, and differentiated it so that there could be perceived an elaborate mechanism in this organ.

He supposed no one went so far as to think that the brain and the mind were synonymous. Was he right in that ? It had been a subject of controversy and was not finally settled, but it seemed not out of harmony with the lecturer's point of view, that the brain was the organ of the mind in the same sort of way as a violin was an instrument of music. He could not conceive of the brain thinking, or planning, or hoping, or loving, or doing any of the things that the mind did, but he entirely admitted that all those things required a physical concomitant. They could only be done, at any rate in our present existence, with mechanism, and he took it that what anatomists were investigating was the mechanism—the mechanism of life, the mechanism of mind, the machinery by which things were accomplished. That was essential.

He thought that went further than was altogether admitted as yet. He thought they would find, not, indeed, material mechanism, but physical mechanism of a kind that could hardly be explored at present ; he meant that in the environment of matter, in the surroundings of matter, in the interstices of matter, in the space between the atoms, in the space between the worlds, he thought they would find there was a continuous entity, as physics had long suspected, and that this might have vital functions to perform. A study of the body showed a material mechanism, but in physics one learned that the material part was but a small portion of the whole. In studying electricity they looked not to the conductors but to what might be called the environment of the conductors, the surroundings of the conductor, the space round it. That was where all the activity existed. He would not be surprised if biologists gradually came to view the physical mechanism as something more than material, something existing in space, but still requiring a material mode of action to display the vital and mental activities.

If what he had just said was at all controversial he must apologise to the lecturer, but it must be understood that he claimed no authority on these subjects, and nobody need attend to what he said. He remembered the controversy between Owen and Huxley, about the "Hippocampus Major," as it was termed, and how Charles Kingsley referred to it in "The Water Babies" ; and what fun he did make of it ! Well, it all showed how strong feelings were about these subjects, when it came to the relation between mind and matter, or between life and matter—a problem that had not yet been solved. The meeting had had an illuminating discourse as to the mechanism, the gradual growth of the mechanism in the individual, in embryology, and in the long course of evolution in the animal kingdom.

Had it not been instructive to see how the growth of the structures depended upon function ; and how first smell, and then vision, then touch, and then hearing, gradually came more and more into prominence, enlarging the organ, or the portion of the whole organ appropriate to these functions, developing it more and more in size and complexity.

The object of the senses was originally for the purpose of getting food and of escaping enemies. That was how human senses grew. Men had inherited their senses from the animals; their senses were no better than those of the animals. Apparently, some of the higher animals in vision were as good as men, and in smell, of course, they were better ; but men used their senses for purposes for which those of the animals were not developed, for investigating, for admiring, for designing and planning, for philosophising, and trying to understand things. The importance of vision had been emphasised that evening, and the importance of binocular vision had been remarked. Most of the animals had their eyes on each side ; men had gradually worked them round to the front, so that they could see the same thing with both eyes, and that had given them a sense of space, an increase of skill, and a combination with muscular movement which was very remarkable.

He did not know whether it had struck his hearers how remarkable it was that a person could play golf with such skill. There was that little ball, and the hole ever so far away, and one got a long club and whirled it round as hard as one could and hit the ball—at least some did—with absolute precision, doing what one liked with it, pulling it, or slicing it, making it rise, hitting it with accuracy and energy —tremendous coordination between vision and muscles. Vision—you must keep your eye on the ball. It could be seen what a part this had played in the rise of intelligence.

Then, he was surprised to find that the extra development of one hand led to handicraft skill. He had always been rather ashamed of not being ambidexterous; his left hand was smaller than his right hand, and his right hand was much more skilled than his left. He intended now to pride himself on that, because in this way he had discriminated himself from the lower animals.

He wanted to thank Professor Elliot Smith in the name of everybody present for his lecture, and he would formally propose a vote of thanks in order to give the meeting an opportunity of expressing gratitude for the trouble he had taken, the slides he had prepared, and the explanations he had given.

The vote of thanks was carried unanimously.

Professor Elliot Smith, in acknowledging the vote, thanked the chairman for the generous remarks he had made. If he might correct the Chairman's golfing analogy, he would say it was not a question of how hard one hit the ball, but of the swing in movement. He had intended to discuss the importance of the intimate correlation of the hand and the posture of the whole body. That was an essential part of skill. The swing of the golf club rather than the force with which a man hit the ball was the essential factor in the attainment of success. Perfect balance, pose, timing and rhythm were as essential for the attainment of skill as the co-ordination of the muscles of hand and arm. The whole of the cerebral cortex was involved in any action. It was one of the achievements of the cerebral cortex that it was a single organ bound up with every one of its parts. In the swing of the golf club a man was using the muscles of his whole body. Keeping his eye on the ball meant that the player's attention was fixed upon the culmination of his skilled action; his hands and body carried out the muscular act without the direct guidance of vision; the attainment of skill was possible because the movements of joints, muscles, etc., were recorded in the brain in such a way as to integrate the swing of the club with the visual fixation of the ball's position. In conclusion, he expressed his gratitude to Sir Oliver Lodge for presiding over the meeting.

DAILY MAIL IDEAL HOME EXHIBITION

Once more a rich clash of brass bands, *au naturel* and wireless, fills the halls of Olympia. Eager queues control their impatience to see "The House that Jill Built," and the houses that Jill's rivals built; and all the while fountains play, and stoves murmur and pretty young women shrilly cry their samples. Let me warn the shy bachelors against going up to the gallery by the main stairs; the shock of suddenly becoming a cynosure for the eyes of so many fancy-dressed maidens may be too much for that calm detachment which it is necessary to preserve if one is to see things as they are.

As a whole the Exhibition is interesting. In detail it is inevitably rather unequal. In a spiritual sense it is hardly even "middle-brow," and the valuable "highbrow" element is much too discreetly represented. One feels that on all sides attempts are being made to find out what appeals to the popular taste; scarcely anywhere is the popular taste being educated, guided, uplifted. Thus a firm may have a square stall with four windows. At the first window we stop and feel pleased; here is something not only *soidisant*, and no doubt really, efficient, but correct and good. But at the second window we see the same lavatory basin, or whatever it may be, no longer simple, but in green with pink spots, and ornamented further with raised enamel dolphins. Window three is as bad, and window four worse. This is being all things to all men, hardly with a worthy motive.

Naturally the same trouble does not arise as seriously with wares like central heating systems, stoves, machines for washing clothes and so on ; and in fact these, in their fitness for their divers purposes, evoke our admiration.

An interesting feature of the Exhibition is the series of Attics treated in different ways. The first of these is amusing ; the Attic " as it so often is." A dressmaker's dummy, a roll of old linoleum, a heap of miscellaneous rubbish, the whole covered with dust. Perfect. Then it would be a savage critic indeed who found fault with the Nursery Attic filled with toy trains by Mr. Bassett-Lowke. The Quiet Room is not very inspired, nor is the Bachelor's Bedroom. But to the Modern and Ultra-Modern Attics we must object—because they are misleading ; catholic modern taste is not so dull, and " futurist " taste, if one may use a dangerous word, neither so tame nor so irrelevant as here suggested. None the less, the feature was an excellent idea, and perhaps it can be more thoroughly developed another time.

At the more peaceful end of the gallery visitors will find the stalls of a number of admirable craftsmen and craftswomen, jewellers, weavers, embroiderers, makers of toys. This modest section is particularly worth inspection. Quality here speaks without words, and the visions conjured up are of an environment in which human grown-ups and children, and also dogs and cats, would be not strangers but at home.

Downstairs, careful scrutiny duly reveals many pleasing items, though these are not often found together in any impressive cluster. A well-known firm of Tottenham Court Road furnishers has one of the most creditable exhibitions. No particular emphasis has been laid on period or modernism ; the furniture is sensible, and many of the minor household accessories charming. The little wood and wicker toast-racks by this firm are just right.

A clear and hearty appearance is presented by the goods exhibited by a caterer for every kind of sport. This is fitting in a British show, though by the way, foreigners, very properly, have not been excluded from this one. There is more luxurious, station-hotel, even spa-hotel furniture than one cares to see ; perhaps it is some comfort to remember that our age has no monopoly of this sort of failing, and that people to-day are more receptive than the greater number of past generations. The xhibition is open until April 17th.

GENERAL NOTE.

ROYAL STATISTICAL SOCIETY.—FRANCES WOOD MEMORIAL PRIZE. The Council of the Royal Statistical Society will again, in 1931, award the Frances Wood Memorial Prize of £30. The Prize will be awarded for the best investigation, on statistical lines, of any problem affecting the economic or social conditions of the wage-earning classes. Competitors will choose their own subjects, but it is believed that original observation or analysis made in the course of the writer's ordinary work or special research will afford useful material for papers, and some suggestions are contained in the accompanying leaflet. Those eligible to compete are :—(1) All undergraduates, and all graduates of not more than three years' standing, of Universities in the United Kingdom, who will be less than 30 years of age on December 31st, 1930. (2) Such non-graduates below the age of 30 years as the Council may approve. Theses submitted or intended to be submitted as university exercises, and also published papers, are admissible. Essays (which must be either printed or typed, and accompanied by copies of all statistical tabulations) must be sent to the Honorary Secretaries of the Royal Statistical Society, 9 Adelphi Terrace, W.C.2, not later than December 31st 1930.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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MONDAY, APRIL 7 Architects, Royal Institute of British, 9 Conduit Street, W 8 p m Mr J H Worthington "Antonio da San Gallo the Younger"

Carpenters, Worshipful Company of, Carpenters' Hall, Throgmorton Avenue, E C 8 p m Prof W H Wagstaff, "The Rainbow"

Engineers, Society of, at Burlington House, W 6 p m Mr R Borlase Matthews, "Rural Electrification and Electro-Farming in Great Britain"

Geographical Society, at the Æolian Hall, New Bond Street, W 8 30 p m Miss E J Lindgren "North-Western Manchuria and the Reindeer Tungus"

Royal Institution, 21 Albemarle Street, W 5 p m General Meeting

Surveyors' Institution, 12 Great George Street, S W 8 p m Prof J Wibberley "The Future of British Agriculture"

TUESDAY, APRIL 8 Anthropological Institute, 52 Upper Bedford Place, W C 8 30 p m Mr A D Hornblower "The Elements of Egyptian Religion"

Civil Engineers, Institution of, Great George Street S W 6 p m (1) Mr B P Haskew "The Rebuilding of the Bassein Bridges on the Bombay, Baroda and Central India Railway" (2) Mr W T Everall "The Reconstruction of the Attock Bridge across the River Indus on the North Western Railway India"

East India Association, at the Caxton Hall, Westminster, S W 4 30 p m Lt Col W G Hamilton, "Imprisonment and Detention in India"

Electrical Engineers, Institution of, at the Royal Technical College, Glasgow 7 30 p m Annual General Meeting.

Empire Society, at the Hotel Victoria, Northumberland Avenue, W C 8 30 p m Major R W Hingston "In the Tree Roof of the Guiana Forest"

Eugenics Society, at Burlington House, W 8 p m Discussion on "Delinquency" Speakers Dr M Hamblin Smith and Judge R L Moore

Geological Society, Burlington House, W 5 30 p m

Marine Engineers, Institute of, 85-88 The Minories, E C 6 30 p m Mr S L Archbutt "Recent Metallurgical Research in Relation to Marine Engineering"

Mechanical Engineers, Institution of, at Swansea 6 30 p m Prof F C Lea "Power Production Past Present and Future"

Petroleum Technologists, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W C 5 30 p m Mr Niels Matheson "Some Features of Modern Steam operated Deep-hole Rotary Drilling Plant"

Photographic Society, 35 Russell Square, W C 7 p m Messrs F R Newens and F J Tritton "The Theory and Practice of Three Colour Negative Making"

Quekett Microscopical Club, 11 Chandos Street, Cavendish Square, W 7 30 p m Dr B E Barnes "Induced Variation in Fungi"

WEDNESDAY, APRIL 9 Civil Engineers, Institution of, Great George Street, S W 6 p m Informal Meeting Discussion on "Recent Developments in Railway Permanent Way Practice with particular reference to the Use of Metal Sleepers" opened by Mr S T Dutton

Fuel, Institute of, at Burlington House, W 6 p m Annual Corporate Meeting Mr W H Jones "The Cracking of Oils with special reference to Low Temperature Tars"

Literature, Royal Society of, 2 Bloomsbury Square, W C 5 15 p m Professional Lecture

Naval Architects, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W C 11 a m Spring Meeting Presidential Address by Admiral of the Fleet the Right Hon Lord Wester Wemyss (1) Sir Westcott S Abell and Mr A J Daniel "Safety of Life at Sea (1929 Conference)" (2) Eng-Captain J Hone Harrison, "Some Materials used for Naval Engineering Purposes"

THURSDAY, APRIL 10 Electrical Engineers, Institution of, Savoy Place, W C 6 p m Messrs S W Melsom, A N Arman and W Bibby "Surge Investigations on Overhead Line and Cable Systems"

Historical Society, 22 Russell Square, W C 5 p m Mr Donald Smith, "Medieval School Life in Finland"

Marine Engineers, Institution of (Junior Section), 85-88 The Minories, E C Film Display

Mechanical Engineers, Institution of, at the Engineers Club, Manchester 7 15 p m Mr Francis Carnegie "The Economical Production and Distribution of Steam in large Factories"

Metals, Institute of, at 83 Pall Mall, S W 7 30 p m Annual General Meeting

At Thomas Cafe, High Street, Swansea 7 p m Annual General Meeting

Mining and Metallurgy, Institution of, at Burlington House, W 5 30 p m

Naval Architects, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W C 10 30 a m Dr W M Meijer "Recent Results obtained in service with the High Pressure Steam Installation of the Holland America Liner *Statendam*" Mr W J Belsey "Performance of Two Vessels with Electric Transmission Gear" 2 30 p m Colonel E Modugno R I N "On the Final State of a Gas discharged from a Reservoir into a Space under Constant Pressure" Dr B C Laws "Notes on the Behaviour of Two Passenger Vessels during a Voyage to and from Australia" Mr F H Alexander "Stability of a Vessel with a List" Prof Dr E G Coker and Mr G P Coleman "Stress Distributions in Notched Beams and their Application"

Patentees, Institute of, at Caxton Hall, Westminster, S W 8 p m The Earl of Cottenham "Motorists' Debt to the Inventor"

FRIDAY, APRIL 11 Astronomical Society, Burlington House, W 5 p m

Chemical Industry, Society of (Chemical Engineering Group), Burlington House, W 8 p m (1) Mr A W Attwooll "The Principles of Manufacture of Mastic Asphalt" (2) Mr D McDonald "Experiences with some Applications of Mastic Asphalt in a Chemical Works"

Dyers and Colourists, Society of, at Manchester Dr J T Hankey "Some Remarks on the Treatment of Aniline Black subsequent to Ageing"

Malacological Society, at University College, Gower Street, W C 6 p m

Metals, Institute of, at the Applied Science Department, University of Sheffield 7 30 p m Annual General Meeting Mr J Russell "Refractories and their Uses"

Naval Architects, Institution of, at the ROYAL SOCIETY OF ARTS, Adelphi, W C 11 a m Mr Robert Sulzer "Causes and Prevention of Vibration in Motor Ships" Dr J Lockwood Taylor "Vibration of Ships" Lt Col E Dondona R I N "Sea Trials of Italian Flotilla Leader" 3 p m Mr G S Baker and Miss E M Keary "Experiments on the Resistance and Form of Towed Barge" Mr W C S Wigley "Ship Wave Resistance Some Further Comparisons of Mathematical Theory and Experiment Result"

Oil and Colour Chemists' Association, 30 Russell Square, W C 7 30 p m Mr E Hatschek "Some Properties of Jellies"

At the Milton Hall, Deansgate, Manchester 7 p m Annual Meeting

Physical Society, at the Imperial College of Science and Technology, South Kensington, S W 5 p m Prof P Debye "The Scattering of X Rays in Gases in Relation to Molecular Structure"

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No 4038 *FRIDAY, APRIL 11th, 1930* VOL LXXVIII

All Communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> " *The purpose of living is to find beauty, to love beauty and from it to generate beauty to the end that humanity may be worthy to dwell under a heaven of stars and that life may be an inheritance worth handing on to others* "
>
> " *Socrates.*"

West Wycombe. In our issue of March 7th we called attention to the condition of the road between High Wycombe and West Wycombe, and pointed out that the Committee dealing with the amenities of West Wycombe were distressed that there was no response from the authorities, or any anxiety to use the powers which they now undoubtedly have for the removal of all advertisements It is useless for the Society to endeavour to exercise control in West Wycombe if the approach thereto is left in this unseemly state. We are very glad to note that Lady Dashwood, of West Wycombe Park, is assisting the Society, and has addressed a letter to Mr. Crouch (through her agent, Captain Rex), in regard to the unsightly advertisement hoardings adjacent to West Wycombe and upon the property of the Great Western and Great Central Joint Committee. We are sure this will have the desired effect, and that these advertisements will be removed forthwith Mr. Crouch, in his reply, makes it clear that he will have no difficulty in this matter, as he quotes the relevant bye-law as follows : -

> " Advertisements Regulation Act, 1925. Byelaws Exemptions 3 (d). Advertisements on or upon any railway station, yard, platform, or railway approach belonging to a railway company or (except within the district of a rural district council) upon any dock, quay, pier, landing stage, wharf, lock, or toll station belonging to any harbour, dock, or canal undertaking. Provided that all such advertisements shall be removed forthwith after their purposes have been fulfilled."

We suggest that if there is any necessary information to convey to the public on these hoardings the railway companies should take advice as to how to do this in a seemly way. We are glad to note that in a letter addressed to Captain Rex by Major Coningsby Disraeli the latter says that he has had his eye on these vulgar advertisements outside West Wycombe station for some time, but suggests that the company may claim these as exempted in the byelaws as being in a station approach. We are quite sure that no company would continue to exhibit advertisements which, in the opinion of the educated community, are offensive. We are delighted to have so powerful an advocate as Major Disraeli in a matter which the Society regards as of immense importance, especially as we have always understood that he was not too favourably impressed with the Society's efforts at West Wycombe. This reminds us that we hope very shortly to make a very interesting statement as to the general progress in regard to the work in the village, and especially the financial position. The Society has not yet made any general appeal to the county, and do not propose to do so until the Guest House is finished, and they have a representative there who will give all information as to the work up to date. They hope to be in a position to start a good deal of work in the village before June, and seriously to take in hand what is to the Society the most important work of all, the thorough reconditioning. They are being seriously held up by the continued lack of definite information in regard to the drainage scheme. It must be nearly nine months since they were informed that an engineer had been instructed to prepare plans for the proper drainage of the village, but no definite information is yet forthcoming as to when these plans will be ready, or even a sketch plan showing the run of the drain. This is very deplorable as no doubt in the very best time of the year the village street will be impassable. May we again appeal to the authorities to expedite this matter, which is of such importance to the work of the Society. Mr. Walter Brydon, who is much interested in the work at West Wycombe, has offered to give some trees to plant round the field on the right as you enter the village. This field belongs to Sir John Dashwood, but it was part of the purchase contract that no building should ever be erected thereon without the consent of the Society, and Sir John Dashwood has given his consent to the planting of these trees. It is suggested that limes would be the most suitable.

The Society has been in negotiation with Messrs. Ashby's Staines Brewery, who have acquired from Messrs. Wheeler the short lease of the three inns, the George and Dragon, the Swan, and the Black Boy. Messrs. Ashby's are anxious to renew their lease with the Society and as a result of the negotiations, they have now made a definite offer which the Council will consider at their next meeting. Messrs. Ashby's have expressed the greatest anxiety to carry out the wishes of the Society and to give the public pleasant Inns and supply the best hospitality' such as one associates with the English Inn of the past. The Automobile Association and others interested in getting better service for the public are anxious to assist the Society in their efforts here.

We are glad to quote the following from this month's issue of *The Furnishing Trades Organiser* :—

> The scheme for the preservation of the historically interesting village of West Wycombe, purchased last year from Sir John Lindsay Dashwood, Bart., by the Royal Society of Arts, is of national importance, inasmuch as it is hoped to give a lead to other centres possessing features unique not only in architecture but in furnishing.
>
> Here at West Wycombe, which practically joins High Wycombe, for lovers of antique furniture and models of considerable interest and value from their local association, a Guest House is nearing completion; and the idea is to carry out the furnishing in such a way as to make the interior of the building a " show place " in this part of England. Owing to its proximity to the Metropolis on the one hand, and to Oxford on the other hand, a Guest House of this description is bound to be a centre of attraction, and it is impossible to estimate its far-reaching effect in stimulating interest in specimens of good craftsmanship which link up the cleverly produced models of the past with modern reproductions of the best type.

There still remain six autographed copies of the West Wycombe Booklet for which offers are invited from any friends of the Society who would like to purchase them. These copies are signed by the Prime Minister, Mr. Ramsay Macdonald, Mr. Stanley Baldwin, Mr. Max Beerbohm, Mr. Gilbert Chesterton, F. L. Griggs, R.A., and Walter de la Mare. The sale of the other six copies has paid for the production of the Booklet, with a considerable surplus which has been added to the Fund.

Charing Cross Bridge.—We hope to deal with this matter at considerable length next week, and reply to Sir Robert Perks' letter on the subject. As a Fellow of the Society he is entitled to full consideration of the point he has raised.

Advertising.—We were talking to a representative of one of the oldest Insurance Companies about advertising. We suggested the revival of the old form of lead tablet to mark the insurance of a building in a particular Company as a delightful way of noting the beneficial financial responsibility of the Company in question. A tin substitute for the beautiful lead Tablet was submitted as the only possibility, and the suggestion of a revival of the old practice was regarded as too fanciful for consideration.

Possibly some point of insurance etiquette forbids the revival of the idea and more blatant methods of advertising are considered more enterprising. There is a delightful collection of these insurance marks in the Guildhall Museum, and we recommend their use again as worthy of serious consideration by the Insurance Corporations.

The Leasowes.—We picked up a tiny little book called the "Cypress Tree," by William Drummond of Hawthornden, the pious thoughts within annotated by William Shenstone. This reminded us that the public concern regarding the sale and breaking up of Shenstone's home seems to have been forgotten. Are desirable plots of land being sold, and the Leasowes being slowly hemmed in by houses, or are efforts being made to acquire the property ? Surely the urgent appeal by the late Mr. Charles Whibley and Mr. Christopher Hussey in *Country Life*, must have appealed to every educated citizen of Birmingham, if not of Halesowen, where evidently Shenstone is not even an interesting memory.

Lectures. A very poor audience attended to hear Mr. Nathaniel Lloyd on April 2nd, with Professor Reilly in the Chair, but it proved a most valuable contribution to the right observation of the refinement of old buildings. In addition to the very beautiful examples of old houses shown on the screen, Mr. Lloyd illustrated his points with some large diagrams of a house in various stages of proportion and dis-proportion. He showed in diagram chimneys well and badly placed. Professor Reilly made an ideal Chairman for the occasion and his appreciation of the Lecturer's points were characteristically informed.

Following Mr. Howard Robertson's admirable lecture on "Architecture of To-day and To-Morrow," these two evenings were certainly eventful. We hope to refer to these two papers again when they have been published.

Portmeirian. There are quite a number of people in England ambitious of being owner-developers of Estates. We cannot recall any really successful efforts. Judging from the beautiful pictures of Portmeirian, Merioneth, Mr. Clough Williams-Ellis was fortunate in the beauty of his possession, but he is to be congratulated on the skill with which he has developed and emphasised such beauty. Mr. Christopher Hussey rightly says in *Country Life* : -

> "If an architect off his own bat can produce so ideal a holiday resort, what, one is disposed to ask, might not be done if the authorities of popular watering places enlisted his services ? With a few tons of concrete and gallons of colourwash, mixed with his brains, how might not an Aberystwyth or a Rhyl, let alone a Peacehaven, be transformed ? In the eyes of Urban Councils an esplanade, a bandstand and a pier, backed by a gloomy regiment of boarding-houses, constitute all that a watering place can desire or deserve. Here and there is to be found more imaginative vision. Brighton has lately reflected its stucco terraces in pleasant flower gardens and taken steps to safeguard its Downs. Eastbourne, happy in an admirably planned and planted skeleton, has pursued a consistent policy. There is something of genius in the way Blackpool manages itself. But, as yet, the Welsh resorts are dingily comatose. May Portmeirian steal into their dreams and awake them to facts—and fancies."

Ewell By-Pass.—We have received a long letter from Mr. B. J. Wilden-Hart, the owner of the greater portion of the land through which the proposed by-pass road is scheduled to pass, and also a further communication from Miss Glyn, the representative of the village of Ewell. We propose publishing these in the next issue of the *Journal*, by which time it is hoped to have a large scale map, and to be in a position to advise thereon.

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An English Art Exhibition.— It is very gratifying to read that the Royal Academy Council, in making plans for exhibitions during the next three years, has decided to adopt the suggestion of Mr. Archibald Russell, referred to in the *Journal* of March 28th and that in January and February they propose to hold an Exhibition of British Art on the same progressive lines as the recent exhibition of Foreign Art. We are sure the Royal Society of Arts, through their Fellows, could be of the greatest assistance in drawing attention to out-of-the-way examples of British Art and craftsmanship hidden away in various portions of England. The only danger of such an Exhibition is that it will reveal to the dealer mind the resources of this country, and we hope steps will be taken to see that what is discovered is really authentic in British Art, and will not remain the sport of the auction rooms Mr. Archibald Russell has done a great service in calling attention to the need of such an Exhibition to raise the standard of British Art in the eyes of the world.

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Pylons and the Countryside.—We apologise to Mr. Frank Hodges for quoting his admirable words on this subject without acknowledgement.

Byron.—The revival of interest in Byron seems to be in the fact that the ninety thousand copies of the French edition of André Maurois' "Byron" (in 2 vols.) sold within about a fortnight. It would be interesting to know the number of copies sold of the English translation. We hope to review this at some length shortly in the *Journal*, and to report further on the purchase of Newstead Abbey through the agency of the Society, negotiations for which, we understand, are progressing satisfactorily, and are only awaiting Sir Julien Cahn's return to England to be completed.

The Ideal Home Exhibition.—At the Ideal Home Exhibition we are always faintly reminded of those childhood's fairy tales, where everything assumes gigantic shapes and the chairs and pots and pans become as big as the house There is the same curious lack of proportion at Olympia and after a while we become totally unable to see the wood for the trees or the house for the patent mangle! Of course, this is hardly a fair criticism, because the very nature of the exhibition is a study of the details and inner working of the domestic machine, but it was significant that the main interest in the big hall was for the details, and the actual model houses and gardens were cast away into the outer darkness beyond. It is interesting to note this because the same thing so often happens in actual life. How little attention is given to the beauty of materials and the proportion of a room, and how much to the lamp and the electric kettle !

It is always interesting and entertaining to walk round this exhibition, and this year there is a very real advance in simplicity and design in the smaller things of life. We specially noted the cheaper furniture as being very much better than before, and some of the model rooms—furnished for a comparatively small sum—were bright and attractive. The Copenhagen pottery near the entrance should be particularly noticed ; it is quite delightful.

There is doubt as to the permanent attraction of the machines which wash and cook and sweep and play the gramophone. They are sure of an eager audience at all times, though whether or not they justify their makers' descriptions will always remain wrapped in mystery. This year they are more complicated than ever, much to the joy of the type of enthusiast who loves a " demonstration."

It is really most entertaining to go from decoration to light, and from light to heat and from heat to gardens, always provided we do not have to do it in a very serious spirit ; for those really searching for a definite object it must be a most exhausting proceeding ! But speaking of heating, the Shell-Mex have a really excellent apparatus for keeping a steady temperature, and their stall is worth a visit—also some of the new devices in casement windows—but if we begin to particularise it will be fatal among such infinite variety.

Cochran's Revue, 1930.—Once again the Pavilion is the gateway to a world of colour and dancing under the skilful guidance of Mr. C. B. Cochran, but this year with a difference, for instead of being the background the decoration is almost the most important part of the entertainment, though with such artists as Oliver Messel and Rex Whistler we have little to complain of on that score.

There is, however, a certain lack of one big personality to pull the whole thing together. When Mr. Noel Coward wrote revue he dominated the whole evening, so did Delysia, but neither Beverley Nichols nor Maisie Gay can quite achieve this. Miss Gay is a delight, as she always is, but she needs better sketches and more comedy support, and also, alas ! there are no tunes which we can walk away humming, a sad loss to a revue even if our families are spared some pain !

To quarrel with anything in such a show seems ungrateful after such scenes as " Piccadilly " and the " Wind in the Willows " and Oliver Messel's " White Heaven." These in themselves are sufficient to pilot any ordinary revue to complete success, but this is no ordinary production, and it is Mr. Cochran's fault that he has led us to expect so much. Last, but by no means least, there is a drummer who makes us realise that genius can be even demonstrated with two sticks and a kitchen chair !

New Buildings in Paris.—Parisians, like New Yorkers and Londoners, are busy everywhere pulling down and rebuilding, if not nearer to their hearts' desire, at any rate nearer to fulfilling modern requirements. We see a remarkable change even in eighteen months. The Champs Elysees is a blaze of advertisements, new and very luxurious flats are going up everywhere. The last fortifications are being pulled down and remnants of old Paris look on, just as old London does, with a rather pathetic wonder as to which corner will be sacrificed next! We are bound to admit that the majority of the new buildings are good in that they are fairly consistent. They do not try to put a building looking like 1940 in an old street or an imitation half-timber mansion among the modern blocks of flats as we do. Most of the new flats are straight stone buildings of about seven storeys with good modern ironwork and eminently suitable for the purpose, but outside Paris the bungaloid flourishes apace and they can give us specimens of villas which we can hardly match for ugliness.

On the whole, however, Paris is better served in the matter of architecture than London, for, as we said before, it is more consistent. How important this is, and how little we seem to realise in England that above all nowadays there must be a singleness of purpose in architecture, or the whole of modern planning will go to pieces and end in chaos.

It is sad to see American methods of advertising being so widely adopted here in garish lights and sky signs and life size posters, but what we call " American " nowadays is merely a certain sort of commercial progress which is spreading everywhere. Somehow it is particularly sad to see soap and car advertisements winking in red lights through the trees of the Bois.

NOTICES

NINETEENTH ORDINARY MEETING

Wednesday, April 2nd, 1930. Professor Charles H. Reilly, O.B.E., M.A., F.R.I.B.A., Director of the School of Architecture, University of Liverpool, in the Chair. A paper entitled " Building Craftsmanship " was read by Mr. Nathaniel Lloyd, O.B.E., F.S.A. The paper and discussion will be published in the *Journal* at an early date.

INDIAN SECTION

Friday, April 4th, 1930. Sir E. Denison Ross, C.I.E., Ph.D., in the Chair. The annual Sir George Birdwood lecture was delivered by Lieut.-Col. Sir Wolseley Haig, K.C.I.E., C.S.I., C.M.G., C.B.E., Lecturer in Persian, School of Oriental Studies, University of London, his subject being " The Maratha Nation." The lecture will be published in the *Journal* on May 30th.

THOMAS GRAY LECTURE

MONDAY, APRIL 7th, 1930. CAPTAIN H. C. BIRNIE, D.S.O., R.D., R.N.R., Elder Brother of Trinity House, in the Chair. COMMANDER F. G. COOPER, R.D., R.N.R., delivered the last of his course of three lectures on " Aids to Navigation." On the motion of the Chairman a vote of thanks was accorded to the lecturer for his interesting and instructive course. The lectures will be published in the *Journal* during the summer recess.

PROCEEDINGS OF THE SOCIETY

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DOMINIONS AND COLONIES SECTION

TUESDAY, FEBRUARY 25TH, 1930

LIEUT.-GEN. SIR WILLIAM FURSE, K.C.B., D.S.O., Director of the Imperial Institute, in the Chair.

The following paper was read:—

SCIENTIFIC AND INDUSTRIAL RESEARCH IN THE BRITISH EMPIRE

By ARTHUR W. HILL, C.M.G., Sc.D., F.R.S.,
Director, Royal Botanic Gardens, Kew

Scientific and Industrial Research in the Empire covers a very wide field, and in order more properly to appreciate the position to-day it is, I think, necessary to look back a few years and see how considerable and how rapid has been the growth of scientific work in all parts of the Empire.

The realisation of the paramount importance of Scientific Research in all branches of Biological Science, during the last few years, which has been very marked throughout the Dominions and Colonies, has, as is well known, created a demand for trained men which at present it is very difficult, and in some cases impossible, adequately to meet.

It is on the botanical side only, however, that I have any claim to speak, since the Royal Botanic Gardens, Kew, have been so closely linked with botanical enterprise in the Empire from the earliest times ; but more particularly during the Directorship of the late Sir William Thiselton-Dyer, when Mr. Joseph Chamberlain was in charge of the Colonial Office.

Both in the West Indies and in West Africa, Kew has played a conspicuous and beneficent part. Following on the depression consequent upon the low price of sugar, schemes were put forward, mainly from Kew, for the establishment of

Botanic Stations in the West Indian Islands, where sugar cane questions could be studied, improvements devised, and the cultivation of other suitable crops could be experimentally undertaken. It was agreed that Jamaica should be the centre of the scheme and that the Stations in the smaller Islands should be linked to the Botanical Department of Jamaica. This was the arrangement adopted in 1887, and in course of time there evolved the Imperial Department of Agriculture for the West Indies, with its headquarters first at Barbados and later at Trinidad.

Profiting by the experience gained in the West Indies, it was then sought to extend the system of Botanic Stations to the West African Colonies, which hitherto had been without a local botanical Agency of any kind. This, let me remind you, was only some 41 years ago.

The first Botanic Station in West Africa was started at Ebute Metta in the Colony of Lagos in 1888, when Captain (later Sir Alfred) Moloney was Governor, and four others followed :—Aburi, Gold Coast, in 1890 ; The Niger Coast Protectorate Station in 1891 ; the Gambia in 1894, and the Botanic Station for Sierra Leone in 1895.

Botanical developments in East Africa came somewhat later.

The general objects of these Stations were that they should serve for

(1) The growth of indigenous trees and plants of marketable value to serve as demonstrations to the Natives.

(2) A practical Agricultural School for training the Natives in agricultural pursuits.

(3) The introduction of alien plants of Economic and Commercial importance and a nursery for their propagation.

One of the marked results of the establishment of these Stations has been the introduction of Cacao to the Gold Coast, which has brought prosperity to the Colony.

The pioneers both in the West Indies and in West Africa were all Kew-trained men, selected from among our Student Gardeners, and men of this type, I am glad to say, are still the right men to be appointed wherever the cultivation of plants is one of the chief activities at a Botanic or Agricultural Station. It is interesting to notice that at present the agricultural staff of the Colony of the Gambia, including the Director, consists of former Kew student gardeners, while the Superintendent and the Assistant Superintendent at Amani, four Plantation Managers in the Agricultural Department, Uganda, and similar officers in other African Colonies, the Superintendent and two Assistant Superintendents, Sudan, and some nine Curators and Gardeners in the Union of South Africa, have all passed through the mill of Kew.

In the course of time the cultivation of introduced plants, the study of their insect and fungus pests, and the growing need for the care and selection of indigenous plants yielding economic products, has led to the expansion of the work of the Stations and their gradual evolution into Agricultural Departments, so that now in Nigeria alone (including the Cameroons), the home of the first West African Botanic

Station, the Director of Agriculture has a staff of 44 scientific officers working in his Department, together with a large number of native assistants. In addition there is an important Forestry service, which also has grown from the original botanic station. Similar growth has taken place in the Gold Coast, Sierra Leone, and the Gambia, and in all the "Colonies" in Eastern Tropical Africa.

During the past autumn an Agricultural Conference has been held in Nigeria, at which all the West African Colonies were fully represented, the Agricultural Adviser, Colonial Office, and the Economic Botanist from Kew being also present.

A meeting such as this indicates the great advances that have taken place in quite recent years, and is a happy augury for the future, since it is becoming more and more obvious that many of the problems in Tropical Agriculture are not peculiar to one particular Colony in West Africa.

It is to be hoped and expected that the study of the questions relating to tropical crops will be applicable throughout our West African Colonies, and that each Colony will endeavour, in close liaison with its neighbours, to solve the particular problem for which it is most suited, and publish the results in such a form that they may be of general value.

The services rendered by the Bureaux of Entomology and Mycology in spreading scientific information are well known, and equally good results will, it is hoped, follow from the new Bureaux in various spheres of Agriculture, which have been created as the result of the recent Imperial Agricultural Conference held in London.

Turning back for a moment to the West Indies, we are, unfortunately, witnessing another serious period of depression, once again in connection with the sugar industry.

What the Commission, which has recently been studying the situation, may suggest, we do not yet know. There is one thing, however, which seems necessary, if agricultural matters are to progress in the West Indian Islands, and that is a closer federation with regard to agricultural matters. Most of the smaller Islands have insufficient funds to support complete agricultural departments, and since most of the Islands have so many features in common, it would undoubtedly be highly beneficial if a competent officer could be placed in charge of agricultural matters in two or three Islands. Under him a subordinate overseer or instructor should be stationed in each Island, with the Imperial Department of Agriculture, strengthened if need be, generally supervising the work throughout the Windward and Leeward Islands, and not only advising the various Governments but also having the power to enforce the adoption of recommendations likely to result in increased prosperity. The recent Report of Mr. G. A. Jones, Assistant Commissioner of Agriculture at the Imperial College of Agriculture, Trinidad, on his visit to the Leeward Islands and St. Lucia, is an excellent illustration of what is needed in the West Indies.*

It is well known that out of the old Imperial Department, so ably established by Sir Daniel Morris and so successfully carried on by Sir Francis Watts, the Imperial

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* See also Empire Marketing Board, publication No. 5. "Report on Development of Agriculture in the Leeward and Windward Islands and Barbados," by H.C. Sampson

College of Tropical Agriculture has been evolved. This College has now come to be recognised as one of the Research Stations which it is realised are essential for the proper study and solution of the many pressing problems which confront Tropical Agriculture. The College also performs another valuable function as a training centre for Agricultural Officers who are to serve in the various Agricultural Departments throughout the Colonial Empire.

Returning to Africa, we find on the Eastern side that the Directors of Agriculture in the various "Colonies" have also appreciated the value of consultation and co-operation, for not only have they discussed their problems in conferences, but they have also, as a result of their recommendation, caused their respective Governments to provide funds in support of the maintenance of the East African Agricultural Research Station at Amani, Tanganyika Territory. At this Station, founded you will remember by the Germans, it is confidently expected that problems involving long-range research, common to more than one of the contributing "Colonies," will ultimately find solution.

The First Annual Report of the Director of Amani, covering the period from April 1st, 1928, to March 31st, 1929, has just been published. The Research Programme outlined is of considerable interest, including under *Surveys* :--

(1) the study of the basic types of East African soils, etc
(2) collection and correlation of data regarding climate.
(3) a study of the results of the interaction of soil and climate as expressed in the natural vegetation.

Under *Investigations*, various problems concerning coffee are enumerated, which need careful examination, including soil fertility, shade in all its bearings, and the incidence and causes of disease. Under *Plant Breeding*, coconuts, cinchona and other crops are referred to, for with all of these much requires to be elucidated, and the research involved is of an order requiring close and careful work over a long period.

It is of interest to note in passing that in the Dominions the need for centralised research work has also been realised and to some extent met by the establishment in Australia of the Commonwealth Council of Scientific and Industrial Research, with headquarters soon to be moved to Canberra. The Federal Government has set up its own body of Research workers and is attempting, in co-operation with the various States, to deal with the larger biological questions which affect the Commonwealth as a whole. Nor should the fine work which is being carried out by the Waite Institute, Adelaide, be overlooked. Similarly, in New Zealand, the Council of Scientific and Industrial Research is attempting to correlate and arrange for the carrying out of fundamental research in the Dominion in various directions. A very useful future should also lie before the newly-established Plant Research Station at Palmerston North, New Zealand.

All these centres for the prosecution of Research overseas need contact with Institutions at Home, in order that they may be kept in touch with all the later developments in the various branches of science.

The importance, for instance, of a close liaison with Kew, in botanical matters, is well illustrated in the attempt which is being made both in Australia and New Zealand to bring about " insect control " of introduced noxious weeds. Working on the assumption that one of the weeds was a British species, steps have been taken to introduce the requisite destructive insect pest.

It was suggested, however, by Kew, that it would be desirable, before matters had gone too far, to make a critical examination of specimens of one of the noxious weeds now covering some thousands of acres in its new home. Specimens accordingly were sent to Kew and it was then found that the weed is apparently not the British species, but a Continental variety; very possibly, therefore, it may not be palatable to the insect which is now being bred for the purpose of introducing it for the eradication of the weed.

Again, with regard to South Africa and East Africa, there are many pasture plants, often singularly alike, some of which are useful while others are very dangerous poisons to grazing animals. Critical examination of all such plants is necessary in a large herbarium. So necessary is this type of botanical research deemed to be by the Government of the Union of South Africa that they maintain a South African Assistant at Kew, whose functions are to study our authentic and documented South African collections, and carry out critical investigations on recently-collected specimens sent over for exact identification and comparison with the historic specimens preserved at Kew.

In this connection I may mention that we have prepared two small illustrated volumes on " East African Pasture Plants," on the suggestion of the Veterinary Adviser to the Governments of Kenya, Uganda and Tanganyika Territory, which serve to give exact information about the pasture plants whether good for fodder or inimical to stock.

The importance of establishing a liaison officer at Kew has also been recognised by the Governments of Australia and New Zealand, as a result of my visit in 1928, but unfortunately, up to the present, suitable botanists are not yet available for the purpose.

It is, however, of interest to mention here that the Government of Queensland, realising the importance that a visit to Kew would be to their Assistant Botanist, and also desiring to have an expert on Grasses from Kew to come over to work at Brisbane, have just sent over their Assistant Botanist to work for a year at Kew, while Kew, with the concurrence of the Ministry of Agriculture and Fisheries, has lent its grass specialist to Brisbane for a year by way of exchange.

I have referred to the work carried out at Kew for our Colonies and to the many openings for research that exist in the domains of Systematic, Economic, and other branches of Botany; it is, therefore, not without significance to find that a visiting scientist to South and East Africa, who is not a Botanist, has been duly impressed by the urgent need for research and the opportunities awaiting the trained investigator.

Sir Richard Gregory, to whom I refer, in his address on " Science and the Empire," delivered at a meeting of the Royal Empire Society, on December 3rd, 1929, records his impressions of his visit with the British Association to South and East Africa, and expresses the real facts when he says :—

> " In both South and East Africa the crying need of the moment is for workers to name the plants. The visitors were told in South Africa, and the same thing is true of East Africa, that if a botanist set to work on any square mile of the country, probably he would find at least one new flowering plant that had no name, and probably more than one. Certainly it is true that whatever interests the botanist may start with when he leaves the Mother country for Africa, he is soon driven by circumstances to turn aside from a primarily physiological or other inquiry in order to ascertain what is the correct name of the plant with which he is working. This is the first need on the scientific side, but it is also true on the practical side. It is of prime importance in relation to problems in regard to poisoning of stock Veterinary officers in Northern Rhodesia took visitors to districts and pointed out probably the plant itself, certainly the group of plants, which are responsible for producing certain symptoms in the stock grazing in that area. This they have been able to do for several years past, but they were still unable to give a name to the plant that is the cause of their trouble,* and as a consequence they are no nearer an understanding of the means of eradicating the trouble, and they have no idea of the extent of the plant's distribution, its season, etc. One of the crying needs of the botanical side is more help on the systematic side.
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> One thing that the home botanist ought to do, therefore, is to supply the workers in this systematic field in the new country. Africa with its own active university departments, all of which have heads alive to the botanic needs of the country, will soon supply its own workers in this field. At present it needs the resources, however, of the old country. As a matter of fact, one of the ironies of the situation is that as nearly all the original work upon the Cape flora has been done by European botanists, the only places where the African plants can be named with certainty at present is in the home country in touch with the big British and European herbaria."

The state of affairs outlined by Sir Richard is one needing our close attention. As he points out, men are being trained in the Universities and Colleges in the Union of South Africa, and there is ample scope for their activities in the Union. Yet in the domain of Taxonomic Botany it is essential that the workers should be in the closest touch with the great Herbaria in Great Britain, and on the Continent, where plants from the whole world are gathered together and the libraries contain so wide a range of botanical literature.

With regard to the tropical portions of the Continent, it should be possible for Amani to give some help in taxonomic work for the East African territories, but Kew will, and must continue, to be the chief source of information for the whole of our Tropical African domains. It is the strengthening of the staff at Kew to cope quickly and efficiently with the difficult questions propounded by Africa alone, and especially by East and South Africa, that is one of the pressing needs at the present time.

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* This surely is the fault of the veterinary officers, and not of the botanist! If they had collected their suspected plants, and sent them to Kew or to Pretoria, they could most certainly have been identified, and information could have been given about the distribution and habits, etc., of the plant or plants causing the trouble —A W H.

Another means by which scientific and industrial research is being promoted in the Empire is through the activities of the Empire Marketing Board. Thanks to the grant given by the Board to the Royal Botanic Gardens, Kew, it has been possible for the Director, either himself to visit overseas portions of the Empire, or to send members of his staff to study particular problems in the Dominions and Colonies. This incidentally has also led to a very large increase in the activities of Kew, owing to its work and functions becoming better known throughout the Empire.

With regard to Africa, the Assistant Director has lately undertaken a mission to the Sudan, on the invitation of the Sudan Government, and journeyed as far south as the borders of Uganda. Mr. Collenette has been engaged in studying the vegetation along the region of the boundary between British and Italian Somaliland, being attached to the Boundary Commission on the suggestion of the Colonial Office and War Office. Mr. J. Hutchinson has been on a collecting mission through the Union of South Africa, arranged by Kew with the co-operation of the botanical authorities in the Union; while another Kew scientific officer, Mr. N. Y. Sandwith, has been attached by Kew to the Oxford University Expedition to British Guiana, for the purpose of making a careful study of the flora of that Colony with a view to the preparation at Kew of a Flora of British Guiana; Dr. Cowan, a temporary member of the Herbarium staff, has been engaged for some months during the past year on a collecting mission in Persia and Mesopotamia, and we have also had a botanist collecting for Kew in the Solomon Islands.

There is a further project for an aerial survey of Northern Rhodesia which is being undertaken to formulate plans for land development. Such a survey to be of real value needs a careful study of the flora on ecological lines, and I hope to be able to send a botanist to be attached to this survey in order that the fullest information may be obtained about the constituents and types of the vegetation in the Colony.

Work of this kind, to be of real value, must be carried out in connection with a central institution devoted to the study of Systematic Botany, and there is no place more suited than Kew, with friendly assistance from the botanists at the British Museum, for undertaking the necessary research which the careful study of the material collected in the field reveals to be required.

It is interesting to notice in the Final Report of the Royal Commission on National Museums and Galleries, the following paragraph:—

> "Since 1903 the Royal Botanic Gardens, Kew, have come under the control of the Ministry of Agriculture and Fisheries, the supreme administrative authority under the Ministry being the Director. Owing to the fortunate absence of statutory restrictions of any kind the economic and scientific work of the Institution has been able to develop freely and rapidly; the contact of Kew with botanical research-stations throughout the Empire and with botanists in all parts of the world is immediate, and is maintained with a minimum of formality. The invaluable 'economic consequences' of Kew, of which the introduction of Para rubber to the East, and of cinchona to India, are well known instances, depend very largely on the scientific work which is carried on in the great Herbarium with its indispensable adjunct, the Library."

The Commission also refers to the need of extension of the Herbarium, which is a very urgent matter if Kew is to continue properly to fulfill its functions in assisting the Empire in the various botanical matters which are constantly being referred to us for scientific advice. Intimately linked up with this great increase in our Herbarium collections is the urgent need of a large scientific staff to undertake the taxonomic work that is required.

With regard to the work on the vegetation of Africa, it will be remembered that Kew has carried out much pioneer work, more especially in connection with the preparation of the " Flora Capensis," which is now completed, and the " Flora of Tropical Africa," which already comprises 9 volumes and still needs a further volume for the rest of the Grasses to bring it to completion. With the termination of these necessary pioneer undertakings, dealing with the vegetation of the tropical and southern regions of the Continent, and owing to the increase of our knowledge of the floras of our tropical Colonies and the importance of accurate knowledge of the plants, which is demanded with the increase of scientific interest and knowledge, the need of regional floras, to deal with the vegetation of smaller areas on more intensive lines, is now becoming imperative. In order to meet this need, which is so essential for the economic development of the vegetable resources of our Colonies, a Flora of West Tropical Africa is now in preparation at Kew, and I am glad to be able to state that nearly three-quarters of the work has been completed. I should mention that in order to facilitate the preparation of this important undertaking, the West African Governments are maintaining an " Assistant for West Africa " on the Kew Herbarium staff. We have also in contemplation a Flora of Eastern Tropical Africa on lines similar to that of the West African Flora, and a Flora of Rhodesia. Some detailed work, as I have already mentioned, has been published relating to the East African Pasture Grasses, which is of considerable economic importance. The first part of a " Flora of the Transvaal," by Dr. Burtt Davy, mainly compiled at Kew, has also recently been published, and a " Flora of the Cape Peninsula " is about to be undertaken by botanists in South Africa.

All this work which is in progress and in contemplation, in connection with scientific research on the vegetation of the African portion of the Empire alone, emphasises the great need that now exists for many more well-trained botanists both at home and overseas, in order that the work may be expeditiously taken in hand. This need for scientific workers, which has been a growing one for some years, has resulted, especially on the agricultural side, in the very useful scheme put forward by the Colonial Office a few years ago for training scholars, who are graduates of our Universities, or qualified students from Agricultural Colleges, to take up posts in the Colonial Service. The selected candidates, it will be remembered, are awarded scholarships usually for a period of two years, one of which is spent at the Imperial College of Tropical Agriculture in Trinidad, where they are enabled not only to obtain an insight into the methods of Tropical Agriculture, but also to learn a good deal about the vegetation of the tropics.

Another indication of the realisation of the importance of scientific research overseas is shown by the recent Report of the Lovat Committee, relating to a unified Colonial Agricultural Service. The importance of the scheme which has been put forward for a unified service lies not so much in the possibility of transfer, without loss of pension rights, which would result from a unified service, important though this is, as in the recognition that scientific officers engaged on research, wherever they may be situated, are entitled to similar rates of remuneration. At present, unfortunately, in some of the Colonies which are not in too flourishing a financial condition, the salaries offered to their scientific officers are unduly low compared with those in Colonies which are more affluent. If it can be arranged that contributions to a central fund can be so pooled that the scientific officers in the smaller Colonies are able to receive a similar rate of pay to those in Colonies which are larger and with better resources, there can be no doubt that the Lovat Committee's proposals will be of very great value. The scheme recommended by Lord Lovat's Committee may be said to have four main objects :—

(1) The further development of agricultural research.
(2) The general improvement of the Colonial Agricultural Services and the full development thereby of Colonial Agriculture.
(3) The improvement of recruitment, in particular by the better prospects which would be offered by the proposed unified service; and
(4) The provision of more experienced officers for the smaller Colonies.

The great need at the present time, in order to cope with the many problems awaiting solution, is to attract the best men. Owing to the importance of the work there can be no hope of getting the men who are needed, unless it is possible to offer a salary which is both sufficient to be attractive and a proper remuneration for the specialists who are required if progress is to be made.

Another valuable outcome of the Lovat Report, thanks to its acceptance by so many of the Colonial Governments, has been the appointment of an Agricultural Adviser at the Colonial Office. This officer, being an experienced agriculturist, with a first-hand knowledge of agricultural science and affairs, both in the Eastern and Western Tropics, is able to take a wide outlook over the needs of our Tropical Empire in Agricultural matters, and also to follow the work and careers of all the scientific officers in the various Colonies. With this new establishment it should be ensured that none of the scientific workers are overlooked for recognition and promotion, and it should be possible to see that the various posts are filled with the men who are best fitted for their spheres of work and for the special needs of each Colony. The Colonial Advisory Council of Agriculture and Animal Health, set up by the late Government, is also serving a very useful purpose in giving careful consideration to all matters concerned with scientific research overseas.

In the past, the Director of the Royal Botanic Gardens, Kew, in his capacity as

" Botanical Adviser to the Secretary of State," was consulted by the Colonial Office with regard to appointments and also with regard to the many problems in botany, agriculture and forestry throughout the Colonial Empire. With the growth especially of the Agricultural and Forestry Departments, it has become no longer possible for one person, occupied with many other matters, to offer adequate advice on the diverse problems which now arise, nor could he be expected to assist in the selection of the large staff of officers, all needing to be equipped with specialist knowledge, now required in the Colonial Service in the various branches of Biology. With the separation of Forestry, with a special Adviser, and of Agriculture, together with the care that is now being taken to watch over the welfare of the scientific workers and to study the need for research into particular problems, I think it may safely be said that Scientific and Industrial Research in the Empire is at last receiving the attention demanded by its magnitude.

Great as has been the expansion in our Colonies since the pioneer days of 40 years ago, when Kew may be said to have been the Father of Botanical Enterprise, in its widest sense, in our Colonies, I feel we are only now at the beginning of scientific developments, which will need more and more men, furnished with the best brains which this country and our Empire can produce.

The vistas in Scientific and Industrial Research which are opening out as we examine and perceive the vast picture displayed by our tropical possessions are wide and long.

We need many more men for the study of pure and applied botany, in the domains of Taxonomy, Ecology and for the investigation of plants yielding economic products; since success in these directions depends entirely on our expert knowledge of the components of the vegetation of a region, and of the physiological or other varietal forms of the plants which yield products of economic value

Then again in the field of Genetics, how much requires to be solved and how inadequate at present are our means of supplying the men capable of undertaking the many long-range problems in genetical research which await investigation ?

I need only instance such staple products as coffee, in East Africa especially ; cacao in West Africa, Trinidad and Ceylon ; cereals in Kenya ; cotton in the Sudan, India and the West Indies; coconuts ; oil palms in West Africa ; and tung oil, which will soon be coming to the fore, and will, it seems likely, offer problems of a similar order to those which are confronting the tea, rubber and coconut industries in the East at the present time.

Where are all the men who are wanted to deal with these matters, who can produce and select true breeding types which will give a maximum yield, and thus ensure the prosperity of any of these undertakings ? Then again, there are the many problems in Plant Pathology, so closely linked with progress or failure in the intensive agriculture which is now essential. Have we the scientific staffs properly equipped throughout the Empire for the great tasks that confront us ?

We look to our Schools, Universities and Agricultural Colleges to meet the demand, but it is of course essential that they should be equipped with an adequate staff of Professors and Lecturers who can give the training required, especially in such directions as Genetics, Plant Pathology and in the wide and stimulating fields of Systematic and Economic Botany. In this latter direction—Systematic and Economic Botany—the enlargement of the scientific staff at the National Institution, Kew, is as I have said, a prime necessity, since Kew is the acknowledged reference centre for the Empire in these matters. Kew, therefore, should be able to undertake Taxonomic research without any delay on every botanical matter submitted from any part of the Empire, and ensure, for example, that no errors are committed through the attempted exploitation of some valueless plant, or that suspected poisonous plants are correctly identified, or again that noxious weeds—as in the case of Australia or New Zealand—are accurately identified before any attempt is made to bring about their destruction by entomological control.

In conclusion I cannot refrain from quoting from the recent address, entitled, "The Tree and the Fruit," given by Sir Walter Morley Fletcher, to the British Science Guild in November last.* He was speaking, of course, of Medical Research, but his remarks are equally true with regard to Botany and Agriculture. An alternative title for his address might well have been "The Labourer is worthy of his hire."

> "To rest satisfied with our present achievements would, indeed, be a counsel of despair, and nothing could be more foolish or inhuman Though our failures and deficiencies may be great, yet the successes already gained in the last few years, which are but as a brief moment in the history of man, should give us boundless confidence. Only the growth of scientific knowledge can bring success, and every victory must wait, as we know, upon the efforts of the unseen army of scientific workers. Practical statesmanship will turn at once to consider how that army can be aided and how it can be augmented. Let me quote Bacon again from his *Advancement of Learning*. Three centuries ago, he wrote, 'If you will have a Tree bear more fruit than it has used to do, it is not anything that you can do to the boughs, but it is the stirring of the earth and putting new mould about the roots, that must work it.' To turn this advice of his into practical effort to-day we must consider in respect of our scientific army the primary questions of recruitment, of pay and of status, and I will take those points in turn.
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> As to recruitment, it can only be in the Universities that the ablest young brains will be caught for the service. While it is true, indeed, because it is true, that as Burke said 'the State is a partnership in all science, a partnership in all art, a partnership in every virtue, and in all perfection,' that Government will always be wise that makes the Universities strong and leaves them free . . . . ."
>
> "If the service of research workers is to be recruited and maintained, questions of pay and status must have paramount importance. I can only speak of this very briefly. So lately as until just before the War, it was the almost universal rule in this country that nobody should be paid for doing research work as such. Unless a man had private means he could only keep himself at research work by being paid to do something else which very commonly conflicted with it. Much of it has always been done of course by University professors and other teachers heavily

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* *The Norman Lockyer Lecture*, 1929, "Medical Research, the Tree and the Fruit," by Sir Walter Morley Fletcher, K.B.E., C.B., M.D., Sc.D., F.R.S., Secretary of the Medical Research Council.

> burdened with routine official duties. Salaries in academic life are in general indefensibly low. Even now professors who may be most eminent men of world-wide reputation, are fortunate if they receive £1,200 a year, which was the low normal standard fixed by the recent Royal Commission for Oxford and Cambridge, and only a few with special administrative responsibilities receive £1,500. These are salaries which men reaching eminent success in any other walk of life would regard as an offence, and even in the academic world the headmaster of a great public school would think of them derisively. In the junior University posts the salaries are relatively even lower . . . ."
>
> " Luckily, the work of scientific research is highly attractive to most eager minds, whether for its intellectual interest or for its promise of usefulness to mankind, or both, and men will always be drawn to it without the lure of high salaries. In my daily work I am continually finding men or women giving service of first-rate value to science and to the nation, yet receiving for their willing toil only a small fraction of what they might have earned in closely allied professional work or in other walks of life. I am very often reminded of what was heard during the War from a wounded man in a hospital in France. A gallant fellow, well over fifty, and the chauffeur of a millionaire, was asked why he had left a secure and useful job at home to fight ; he smiled through his bandages and said modestly, ' I suppose my curiosity got the better of my intelligence.' Very many research workers I know are entitled to make the same kind of whimsical but heroic explanation of their motives . . . ."
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> " Not only fairness, but enlightened self-interest should provoke any nation to bring the pay of competent research workers to such a level that they may hope in middle life, at least, to be able to bring an education as good as their own within the reach of their children. Until that is done we are in practice ensuring the sterility of those who almost by definition must be counted as among the most desirable begetters of our future stock."

We owe much, as I have attempted to indicate, to all those who in the past have laboured to solve the botanical problems of the Empire as they saw them, and we, now, have entered into their labours. They were hampered in their work often by imperfect knowledge and usually by inadequate facilities. Yet "these all" it may truly be said worked " in faith, not having received the promises but having seen them afar off." What then can we do but endeavour fully to realise our responsibilities, and to build adequately and securely on these foundations with all the resources at our command, if our " Tree," to return to Sir Walter's simile, is to come to full fruition. We look back to the sowing of the seed and the growth of the young tree and now are almost bewildered by the vigour and the ramifications of its branches. Here and there precocious fruits have been developed and ripened, but it remains for us so to cultivate our tree and give it our best attention that it may fully develop into the " Tree of Knowledge," and yield " leaves " which shall be " for the healing of the Nations."

DISCUSSION

The Chairman said he thought that those who were present might well congratulate themselves on having heard such an extremely interesting lecture from Dr. Hill ; and also on another matter, that Dr. Hill was the Director of this great tree which had thrown out its branches over the whole Empire. He believed it was 200 years ago that Kew Garden was started, by the Prince of Wales of the time, but it was only 90 years ago that it became the national botanic garden. Dr. Hill had shown in this paper what wonderful work this centre had done, and long might it continue. He thought appreciation of Kew as the centre had been a good deal fostered in the last three or four years by the constant journeyings to outlying parts of the Empire undertaken by Dr. Hill and members of his staff There were no party politics in this Society, and he hoped all realised what a real debt was owing to Mr. Amery, Mr. Ormsby-Gore and Lord Lovat, for the fine work they did while they were in charge at the Colonial Office. Their having started important conferences and kept others going had shown to the world at large how important these matters were, and it would mean a great help to the work in the future. The Empire Marketing Board had been mentioned, and it was a delight to hear the reference, as that was a body which was spending money in a practical way not only in publicity but in helping on research work of great importance to the Empire.

Professor V. H. Blackman, F.R.S., desired to join with the Chairman in congratulating Dr. Hill on having given such an admirable address. As the Chairman had said, no one could speak with more authority than Dr. Hill, for apart from his position as Director of the Royal Botanic Gardens, Kew, his wide travels had brought him into touch with agricultural development throughout a large part of the Empire. As a result of his energy and foresight grants had been obtained from the Empire Marketing Board to aid the development of Kew in directions which would be of help to the agriculture of the Empire. Had it not been for the Empire Marketing Board, the only Government department which in these days of financial stringency seemed to have money to spend, the development of Kew Gardens and of other agricultural research institutes would have been severely handicapped.

He was glad to see that Dr. Hill had stressed the difficulty in the biological field, of finding a sufficient number of qualified men. This difficulty had existed for years and still remained. One might say that applied biology was the only scientific profession in which there were more posts than fully trained applicants. He hoped that the publication of this address of Dr. Hill's would do something further to open the eyes of people to the importance of work in this field. The development of agricultural research in the Empire was being, in part, held up because of the dearth of trained men. It was obviously of no advantage to found a new agricultural research station if it could only be fully staffed by transferring men from other research stations. Until a greater number of competent men entered the biological field this serious handicap on the development of agriculture must continue.

Professor H. E. Armstrong, F.R.S., said that what had been stated at that meeting would reach, through the medium of the *Journal*, all parts of the Empire and of the world. The platform of the Society was, to-day, one of the best in the world for the dissemination of scientific information. Dr. Hill's paper bristled with information which would be of the greatest value, particularly in the direction which Professor Blackman had indicated, showing how immense were the opportunities and the great needs. In that way it would constitute a guide.

The speaker had been concerned with this problem in connection with Christ's Hospital over a long period, and he knew how much these statements would appeal to schools. It had been his great privilege to know Sir William Thiselton-Dyer from the time of his appointment to Kew. He knew what Kew had done in the interval, and how much Sir William contributed to that work, the foundations having been almost entirely laid by him—not only the foundations of work of industrial importance throughout the world but the foundations of scientific botany. Sir William's early translation of Sachs set botany on its feet in this country, for until the date of the appearance of that translation little had been done in teaching the subject.

To some extent, the speaker felt that he was qualified to contribute to the discussion on this paper, as he had been connected with Rothamsted since 1870, and as he had seen the Tropical Gardens of Ceylon and Java and also Australia; as he had also worked, in connection with the India Office, on indigo for a considerable period, he could well appreciate all the points which Dr. Hill had made

The paper, however, was a very difficult one to discuss, as it covered so wide a field, without raising specific issues. The title was too broad: it should really be agricultural scientific inquiry. Recently in that room, in a discussion of Sir Daniel Hall's wonderful paper on Kenya, which would be found in the current *Journal*, he, the speaker, deprecated the use of the word "research." He would like to see that word banned from discussions in this Society, as, to his mind, it signified little more than pottering in a laboratory.

He would suggest a new term—*Real-search*—as meaning study and inquiry carried out scientifically, real study, under proper leadership, with a definite objective and some guarantee that rational use could and would be made of the results.

Research workers, especially in agriculture, to-day, were for the most part an uncoordinated horde, engaged upon trivial tasks, wasting a large amount of money. It was all very well, in the past, to accumulate results, hoping to make use of them. To-day we had *scientific method* at our disposal—if we chose to make use of it. We did not, as a rule. We allowed incompetent leaders to control incompetent workers—both incompetent, because they had no clear objective, never having been trained to think and to set out their results with effect. To tell farmers that you would accumulate facts for them to make use of was worse than absurd.

To make agricultural inquiry effective to-day we needed a new class of workers men of the Horace Brown type, with a fully-developed sense of scientific method-not myopic specialists—men who would study the subject of an inquiry entrusted to them and fit themselves for it before entering upon the work.

Primarily, the problems were economic. Take sugar and grain. Was not over-production, the greed to manufacture, the root evil? Crookes made the fatal blunder of assuming that we should want for wheat in the future, because of the lack of nitrogen. We never could, while we had our atmosphere and the leguminous plant. Europe was fouling its own nest to-day by sending manufactured nitrogenous fertilisers to the East, there to be converted into sugar. As a consequence, in face of such competition, the economic production of sugar in Europe was becoming impossible. Canada, he believed, had grown more barley this last year than the world needed—with the aid of cheap land and machinery. Man was now at a discount upon our lands.

Our country to-day had no agricultural policy—not a man, apparently, capable of formulating one. Here was the opportunity for *real-search* to begin. We needed to pool our knowledge and experience effectively. We rarely brought the right people together—the blind were usually asked to lead the halt. We talked eternally of science and of research—but as yet there was no calculated scientific method in us. Our research was make-believe, in large part.

On every possible occasion, in this room of late, he had dwelt upon our future great agricultural need—*Phosphate!* As yet, we had taken no thought for this matter. We needed to consider the condition of our Empire in this particular more than any other. What was the condition of Australia? The whole future of the continent might depend upon the answer. We needed to survey the soils and attach a phosphatic index to every square mile of our possessions. The map, probably, would be a sorry spectacle of low values—apart from other deficiencies Probably, we should be led by it to limit populations—at least, recognise the need of an enforced reduction in the standard of living, at no very distant date.

With such problems in the offing, something more than sitting upon the laboratory stool—upon the fence—was demanded of us: real hard thought-*Real-search!*

MR. F. A. STOCKDALE (Colonial Office) said he had listened with very great interest to the paper which Dr. Hill had read. In it he had stressed two points (1) the importance of systematic botany, (2) the work which had been done at Kew. The speaker had a feeling in that direction, because when he was at Cambridge Dr. Hill endeavoured to get him to learn some systematic botany. The speaker feared he rather took to the applied side of the science, and in the Colonies he had seen a change-over from the botanic stations which were started in the West Indies, and later in West Africa, to agricultural departments. The work of the botanic stations was connected largely with the introduction and acclimatization of exotics but subsequently it was found that a more intensive study of the indigenous agricultural products was necessary, and that research on these particular problems was essential. Therefore, he found that the Botanic Gardens gave rise, by the addition of other officers, chemists, mycologists, and entomologists, to the agricultural departments. There were, in the Colonial Empire, a number of agricultural departments which had developed in that way.

There was one point which was of importance in this matter, because it had been quite clear to workers in the tropics that, however wide one's scientific knowledge in the early days, it was impossible to cover all the specialist aspects of agriculture. Consequently it had been necessary to bring together teams of workers, specialists in their own particular subjects, who could form a corporate whole and work together. That was the policy which Lord Lovat's Committee of the Colonial Office had decided upon, as being the policy which promised the most successful results. It was by strengthening the agricultural departments, by increasing the number of research stations with teams of workers, that progress could be expected. One saw it developed to a greater extent in the East, where large plantation industries, such as those of rubber, tea, cocoanuts, had evolved research schemes for their own particular province, where numbers of men were grouped together to work as a team on the problems presented by particular crops. The development had been very rapid indeed, but one was faced, as had been said by both Dr. Hill and Professor Blackman, with a great shortage of men. It was impossible to find the right men to fill the posts which were being created every year in the Colonial Empire. That was, he thought, due to the fact that in the schools of this country the attention of the young men was not directed to botanical or biological sciences. The position was a difficult one, because if one went to the University and took up either botanical or biological science one might find oneself at a dead end. There were a large number of men who had that fear. But it should be realised that administrative officers in the Colonies came into contact with biological problems every day of the year; they had to deal not only with the social habits of the people they were there to serve, but also their agriculture and their stock. If that were properly realised, he thought it would be found that a greater number of men would take up the biological sciences with the view to eventually joining the Colonial services in the administrative branches, if they did not qualify as first-class biological workers for technical appointments.

And there was another aspect which he would like to direct attention to in regard to Dr. Hill's paper. That gentleman mentioned that an economic botanist had recently been attached to Kew. Mr. Sampson had already visited a number of Colonies, and he had clearly shown to the workers in those Colonies the use of such an appointment at Kew. We had agricultural crops in which there were innumerable strains, and those strains had different habits of maturity, different habits of growth in the different soils and under different climatic conditions. It was along those lines that the Colonial workers needed assistance, and it was in that direction that, he felt, Kew could help the Colonial Empire He would like to see a much wider development of that aspect of the work at Kew. It was not a question merely of importing a particular tree or plant to try in any particular area ; it was more a necessity of getting a particular variety suitable to the environmental and climatic conditions in those areas. Further knowledge of that kind was needed.

Sir Richard Paget, Bt., said there were one or two points which it might be useful to emphasise on the economic side. Dr. Hill said he wanted some thumping millionaire. The only way of baiting the trap for such was to show him some kind of balance-sheet ; and if Dr. Hill could spend any more time in giving some impression in figures of what was the economic value, in pounds, shillings and pence of the discoveries which were made in botanic research, the speaker thought there would not be much difficulty in getting a private millionaire to help, or even in getting money from the Chancellor of the Exchequer. Even from what the speaker knew, the money spent on botanic research was an extraordinarily good investment, bringing in such a return as would make the mouth of any industrialist water.

He would like to ask whether there were openings for women as well as for men in this field of applied biology. Another suggestion—which probably had occurred to others, but it might be emphasized again—was that if one wanted to interest young men in a possible future career, they must be interested quite early ; one must talk to them at the public schools, or even in private schools. These schools were always glad of lecturers, with lantern, to show the possibilities of applied biology and anthropology ; it would stir the imagination of many a young man, and give him a lead.

He wished to add his strong approval of Professor Armstrong's remarks about the economic side. There was no question that a good deal of thought was needed as to how man could best deal with the problem of over-production. No one could pretend that the world now had enough indiarubber, or enough sugar, or enough glass, or iron or copper the world over ; yet in regard to all those things we were suffering from what was called over-production. He would like to tell a story so as to point a moral.

This last season, in Hungary, they had a bumper crop, a case of over-production. Instead of that being an occasion for good cheer, and the people saying they now had enough to last two years instead of one, what happened was this : It was the custom of the Hungarian farmers when the crops had been gathered in, to go to the banks and say, " Here is our crop, it is worth so much. Will you advance us money so that we can pay our men and buy stores for the winter ? " This year, when the farmers and peasants went to the bank, they were asked, " What is your crop worth ? " The reply was " Twice as much as last year's." Then the bankers said, " Yes, that is the trouble, it is not saleable ; we can't lend the money to the amount we did last year." And they did not. So the peasants and farmers could not buy their supplies for the winter. The local factories, therefore, had no work, and many hands were dismissed. There is no " dole " in Hungary, and the final result of the very good harvest was that there was starvation in Hungary to-day.

Professor Armstrong desired to know whether botanical and biological qualification was rare among boys. He was himself a chemist with a biological trend but not half-a-dozen of his friends among chemists had shown a biological trend.

Dr Hill, in reply, said there were considerable openings for women ; the research branches had vacancies for them, and at Kew there were women who were doing the same type of work as the men. They seemed to be interested more especially in the mycological side. But most of the Colonial posts he did not think were suited for them.

As to bringing this work before boys at school, that was being done. The Colonial Office, through Lord Lovat's Committee, realised that it was important to bring home to boys what posts there were available in the Colonial service, and particularly to encourage boys to enter for the Colonial Scholarships. When agricultural officers were home on leave it was often arranged for them to go to one of the schools or to Oxford or Cambridge and talk to those interested in the work ; and he thought it probable that more would be done in that direction, as it had already been fruitful of result.

In regard to Professor Armstrong's question as to whether boys were nowadays keen on the biological side, he did not know, as it was now a long time since his schooldays ; but he thought that one of the things which was tending to stop our markets was the forcing on of boys at school to enter for scholarships and exhibitions. And there was competition between one school and another, which he thought a pity. In such cases it was liable to result in a mere question of the acquisition of facts, without a real interest in natural history, and so they did not take to it afterwards when they emerged into the world. In former days, when there were not so many posts open, and boys with a leaning towards natural history had opportunities of developing their own tastes, it would seem more true naturalists came forward than was the case now.

A vote of thanks to Dr. Hill having been carried unanimously, the meeting terminated.

CORRESPONDENCE

THE LEGION BOOK

The Prince of Wales, as you know, left this country for Africa on the 3rd January, and I am most anxious that during his absence a determined effort should be made to increase the sales of " The Legion Book " up to 100,000 copies.

If this figure were attained, and possibly overstepped, the news would be particularly gratifying to His Royal Highness on his return.

The above figure cannot be attained, however, without the help of everyone to whom I am writing, and if your readers have already purchased a copy, it is hoped that they will purchase further copies for the benefit of patients in any hospital in which they may be interested.

This appeal is world wide and can never be repeated, and in answering it not only will they be helping a cause which is particularly dear to the heart of the Prince of Wales, who is also the Vice-Patron of the Society, but they will also be helping something in which His Majesty the King has shown a personal interest, and about which he has expressed the wish that is stated on the accompanying prospectus

Cheques should be made payable to The British Legion Book Fund,* and one shilling added to cover postage.

LIONEL HALSEY.

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* The price of "The Legion Book" is 21s. net Orders should be addressed to Admiral Sir Lionel Halsey, G.C.M.G., G.C.V.O., K.C.I.E., C.B., Comptroller and Treasurer to H.R.H. the Prince of Wales, St. James' Palace, London, S.W.1

OBITUARY

MARTIN HUBERT FOQUETT SUTTON.—Mr. Martin Sutton, of Erleigh Park, Reading, who died suddenly on March 27th at the early age of 54, was the second senior partner in the well-known seed firm of Messrs. Sutton and Sons, Reading. Born on November 28th, 1875, he was the son of the late Mr. Martin John Sutton, of Wargrave Manor, Berks, and was educated at Harrow and Christ Church, Oxford. On leaving the university he made a tour of the Dominions and Colonies in 1896 for the purpose of studying agriculture, and in the following year became a partner in the family firm. Throughout his life he took a keen interest in scientific agriculture and represented his firm on a large number of agricultural bodies. He was a Past Chairman and a member of the Committee of the Farmers' Club, a member of the Council of the Smithfield Club, a Governor of the Royal Agricultural Society, and a member of the Council of the Central Chamber of Agriculture. Mr. Sutton recently revised his father's well-known work on "Permanent and Temporary Pastures," and was himself the author of several books on seed production and fertilisation. He had been a Fellow of the Royal Society of Arts since 1914 and was also a Fellow of the Linnean Society and the Geographical Society.

SCRIVEN BOLTON.—Mr. Scriven Bolton, who died recently at his home at Bramley, near Leeds, had already at a comparatively early age—he was in his early forties—gained some international recognition in astronomical matters. Although he was not a professional astronomer, being in business as an oil merchant, astronomy was the main interest of his life, and he had built a remarkably well-equipped observatory near his home, where by means of a revolving telescope fitted with an 18in. mirror, he was able to expose a photographic plate and follow the progress of a single star for a period of two hours. He was also a clever draughtsman, and many of his astronomical drawings were published in *The Illustrated London News*, *The Graphic*, *The Sphere*, *Le Journal Astronomique de France*, and also in American papers.

He exhibited from time to time at various exhibitions, and, among other awards, received a gold medal for his exhibit in the science section of the Franco-British Exhibition of 1908, and a diploma for drawings of astronomical subjects at the Japanese-British Exhibition of 1910. In addition to being a Fellow of the Royal Society of Arts, he was a Fellow of the Royal Astronomical Society, a member of the British Astronomical Association, and an honorary member of the Société Astronomique de France.

NOTES ON BOOKS

The Acoustics of Orchestral Instruments and the Organ. By E. G. Richardson, B.A., D.Sc., Ph.D. London: Edward Arnold & Co. 10*s.* 6*d.* net.

This book, which is based, as the author explains, on a series of lectures delivered to a number of young persons in the music trades, will be of value also to many older persons interested in the theory or practice of orchestral music.

It opens with a chapter on the production and propagation of sounds from wind instruments, in which the author explains, in simple language, the general principles of sound production and the nature of harmonics. The descriptions on p. 15 (harmonics), p. 20 (reflection) and p. 28 (difference-tones) might in the next edition be amplified; at present they suffer to some extent from excessive condensation.

Resonance and wave-length are well explained; summation tones are mentioned, but not described. Fig. 8 (difference-tone whistle) would bear description.

Chapter II, on the flute, gives an excellent account of sound production by edge-tones, of the effects of over-blowing and under-blowing, and of the simple theory of the frequency (pitch) produced by the uncovering of a given note-hole.

Chapter III deals with reed instruments, and emphasises the interesting point that the air in the player's mouth cavity actually forms part of the vibrating system. The little-understood action of the mouthpieces of the trumpet and horn types is discussed; in this connection it would be of advantage to show sections of the mouthpiece of Plate VIII, Fig. 3.

Chapter IV, on Brass, develops the theory that the sound production depends in part on edge-tones as to the possibility of a player producing one tone by the vibration of his lips and air column of a horn, and another by humming. Experiment with a bugle mouthpiece shows that two independent scales can be simultaneously produced in this way, just as they can by humming and whistling.

Chapter V deals with Percussion and the ting of bells.

Chapter VI describes the vibration of strings, and emphasises the fact (which some pianists may not willingly accept) that in the matter of tone, "the only thing which the player can vary is the velocity with which the (piano) hammer strikes the wire." The author's implication (p. 115), that the harp has no sounding-board, needs revision; indeed, the Gaelic word for harp is derived from the sound-board. In describing the action of the violin, the author mentions the lateral rocking of the bridge, which produces the main effect, and the longitudinal rocking which accompanies it. It might be pointed out that (as Giltay has explained) the to-and-fro rocking motion takes place at *twice* the frequency of the vibration of the string.

Dr. Richardson refers to the need of further research for the perfecting of bowed instruments. In this connection a diagram of the strohviolin (p. 126) would be of interest as an example of the application of modern acoustic devices to a bowed instrument. In Fig. 26 (Backhaus) the characteristic of the Stradivarius resonances would appear to be rather that the principal resonances are higher in pitch than that they are more evenly distributed; the violin of inferior quality (No. 4) actually has its resonances more evenly spaced, but the principal resonance is at 2,500 vibrations per second, as against 3,500 (or over) for the Strad.

In conclusion, Dr. Richardson discusses the orchestra as a whole, with a brief reference to the acoustics of concert halls. There is a nine-page mathematical appendix on the Theory of Fingering and Cross-fingering on the Wood-wind, and a short index. Altogether, a very useful book which will bear extension in a future edition.

R. A. S. Paget.

Nero and Modern Time : drawn by F. Brangwyn and W. Walcot.

Messrs. Whitehead's have chosen a pleasant method for advertising their wares, which are marble. They have quarries at Carrara, San Stefano and elsewhere in Italy, and among the contracts which they have recently carried out is the decoration of the Mond Room at the National Gallery, the Director and Trustees of which are at pains to assure a proper setting for the choice collection in their wardenship.

This little picture-book, called, rather surprisingly, " Nero and Modern Time," contains drawings by Mr. Frank Brangwyn and Mr. W. Walcot, both of the Italian quarries and the London workshops. The Brangwyns are characteristically and appropriately romantic, while Mr. Walcot's vivid contrasts of black and white suggest the scenery and the virgin marble itself, sometimes with considerable effect. Brangwyn's Marble Transport from the Quarries, with the wild hills in the background and the patient oxen toiling in the foreground, is good of its kind.

But the text which accompanies these illustrations is not really quite worthy of them. The business about Nero, Michaelangelo, etc., is, frankly, what the French would call a *galimatias*. This is not a slang word ; approximate English translations will be found in Cassell's dictionary. Are we to suppose that only a few highbrows appreciate plain, objective statement ? The editor of " Nero, etc.," would be surprised if he knew how many Doctors of Philosophy took Whittaker's Almanac to bed of nights.

GENERAL NOTES

Scholarships in Chemistry, Applied Chemistry, Physics, Mathematics, Electrical and Mechanical Engineering and Metallurgy.—In co-operation with the Polytechnic and Association of Principals of Technical Institutions, a Scholarship Foundation of far-reaching importance has been inaugurated by the Institute of Patentees (Inc.). With the object of encouraging inventive talent amongst those whose circumstances do not permit them to undergo the ordinary courses of technical training, the Institute has decided to found a series of Presentation Courses at one or more of the recognised Technical Schools and Polytechnics which exist throughout the country. The possession of some technical knowledge is essential to the production of a successful invention. The records of the Patent Office show all too clearly that inventors are often hampered by the lack of any basic scientific education. The Institute of Patentees is aware that an increasing number of young men and women are becoming interested in all popular technical matters, and that amongst them are many to whom the support may afford an opportunity of making contributions to industry and commerce of the utmost national importance. The Scholarships will be granted by the Institute of Patentees at the Polytechnic and Local Technical Colleges for courses commencing in September, 1930, and are open to candidates of both sexes of all nationalities and, in general, of any age over 16. They entail about three evenings' work a week, in addition to home work. All applications should be addressed to the General Secretary, Institute of Patentees, 39 Victoria Street, Westminster, S.W.1, and will be considered by a Committee set up by the Institute. The Committee will include not less than two members of the Association of Principals of Technical Institutions. Successful candidates will have all the necessary fees paid for them, which will include Associate Membership of the Institute of Patentees and a grant of £1 towards the cost of books.

FOURTH INTERNATIONAL EXHIBITION OF MODERN DECORATIVE AND INDUSTRIAL ART.—The British section of the Fourth International Exhibition of Modern Decorative and Industrial Art, to be held at the Royal Palace, Monza, Milan, from April till October, is arousing widespread interest in Italy. The arrangement of the exhibits is on original lines. Instead of showing pottery, glass, fabrics, furniture, etc., grouped according to category, an effort has been made to show them in relation to their use. The main theme is the British day and the articles associated with it. Thus, the first section—"7.0 a.m. Early Morning Tea," shows a lady's bedroom, complete with the usual accessories. The remaining sections show various hours of the day—"8.0 a.m. Breakfast." "9.0 a.m. Office," and so on. Painted on the background of each section is a clock-face with hands pointing to the time represented surrounded by amusing illustrations of the actions and things associated with the hour, thus conveying the idea irrespective of language. The Commercial Art section has as its principal feature a representation of Leicester Square Tube Station platform, with posters in position as in London. Many of our most famous houses are co-operating in this exhibition, and as a large attendance of visitors from all parts of the world is anticipated, British trade overseas should receive some stimulus. The organisation of the British section has been entrusted by the Italian Government to *The Studio* and its associated magazine *Commercial Art*.

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

MONDAY, APRIL 14..Brewing, Institute of, at the Charing Cross Station Hotel, Strand, W.C. 7.45 p.m. Messrs. A. W. Kibble, W. J. Watkins and C. E. White, "Bottling."

Carpenters, Worshipful Company of, Carpenters' Hall, Throgmorton Avenue, E.C. 8 p.m. The Rev. Canon S. A. Alexander, "The Preservation of St. Paul's Cathedral."

Electrical Engineers, Institution of, Savoy Place, W.C. 7 p.m. Informal Meeting. Discussion on "Telephone Exchange Practice in Germany and Scandinavia," opened by Mr. A. B. Eason.

At the University, Liverpool. 7 p.m. Annual General Meeting.

At Armstrong College, Newcastle-on-Tyne. 7 p.m Annual General Meeting.

At the Town Hall, Cheltenham. Lt.-Col. S. E. Monkhouse and Mr. L. C. Grant, "The Heating of Buildings Electrically by means of Thermal Storage."

At the University, Edmund Street, Birmingham. 7 p.m. Messrs. H. A. Humphrey, D. M. Buist and J. W. Bansall, "The Imperial Chemical Industries Limited's Steam and Electric Power Plant at Billingham.".

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.30 p.m. Mr. T. B. Hare, "Dock Capacity."

Victoria Institute, at the Central Hall, Westminster, S W. 4.30 p.m. Lt.-Col. A. H. C. Kennedy-Herbert, "The Last Days of Our Lord's Ministry."

London Society, at the Royal Society of Arts, Adelphi W.C. 5 p.m. Dr. Raymond Unwin, "The Decentralisation of Industry."

TUESDAY, APRIL 15..Egypt Exploration Society, at Burlington House, W. 8.30 p.m. Mr. Alan W. Shorter, "Egyptian Amulets."

Electrical Engineers, Institution of, at the Hotel Metropole, Leeds. 7 p.m. Annual General Meeting.

Statistical Society, at the Royal Society of Arts, Adelphi W.C. 5.15 p.m. Mr. J. H. Richardson, "International Comparisons of Real Wages."

Transport, Institute of, at the Institution of Electrical Engineers, Savoy Place, W.C. 5.45 p.m. Mr. R Bell, "Transport Developments in 1929."

WEDNESDAY, APRIL 16..Civil Engineers, Institution of, Great George Street, S.W. 6.30 p.m. Mr. P. Adamson Scott, "Weymouth · Bincleaves Firing Station; Repairing and Strengthening of Reinforced Concrete Pier."

Electrical Engineers, Institution of, at the Royal Victoria Hotel, Sheffield. 7.30 p.m. Mr. H. S. Carnegie, "The Selection of Electric Drive for Heavy Industrial Use."

Meteorological Society, 49 Cromwell Road, S.W. 5 p.m. (1) Dr. S. K. Banerji, "The Electric Field of Overhead Thunderclouds": (2) Dr. F. J. W. Whipple, "The Great Siberian Meteor and the Waves Seismic and Aerial which it Produced."

Microscopical Society, 20 Hanover Square, W. 8 p.m. (1) Mr. A. Craig-Bennett, "An Imbedding Apparatus for Research Workers: (2) Mr. John Smiles, "The Measurement of Spherical Aberration in High Numerical Aperture Objectives by Interferometry."

THURSDAY, APRIL 17..Electrical Engineers, Institution of, at Trinity College, Dublin. 7.45 p.m.

At the Municipal College, Portsmouth. 7.30 p.m. Dr. C. V. Drysdale, "Alternating-Current Potentiometers and their Applications."

Mechanical Engineers, Institution of, at the Hotel Metropole, Leeds. 7.30 p.m. Mr. A. H. Gledhill, "Transfer Mechanisms."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

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All Communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

Laws, however contriv'd for the Benefit of a People, will yet be evermore found to be too Strong for the Weak and too Weak for the Strong.

"*Characters and Observations,*" *attributed to Pope.*

The Countryside.—Turning over recent numbers of *The Listener*, which we find increasingly interesting in all departments of Art and Science, we find much on the subject of the countryside. "The approach of Spring is the signal for renewed efforts on the part of those who are trying to prevent the desecration of our countryside." We have already quoted Mr. J. E. M. Joad: "It will be said of this generation that it found it a land of beauty and left it a land of beauty spots." We record two excellent references in *Talks* by Mr. C. R. Ashbee and Sir Henry Newbolt:—

> "All who have the vote should use it in such a way as to concentrate not on the political questions but the questions that affect the home. See that men and women are selected on Urban and Rural Councils who will undertake to deal with the question of the parks, of advertisement, of litter. If in one or other constituency it were found that a Rural or an Urban Councillor had been unseated because he was not helping to put into force the powers that Parliament had given to the Councils, it would very soon be found not only that your own Council would begin to want the powers enforced, but that the Ministry of Health would step in and order them to be enforced. The Ministry, in many of these matters, has Parliamentary powers, but, rightly, does not like to use them unless it knows that public opinion is behind. It is up to you to make public opinion."—*Mr. C. R. Ashbee.*
>
> "I have spoken first of a new hope left us by the War. I will set it off by speaking of a new apprehension. It is one worth mentioning because it is wholly unexpected and touches us in a vital spot. What has been happening to our love of freedom?

> During the War our freedom was very markedly diminished. It was wholly to the credit of the nation that necessary precautions and limitations like the censorship and food control were readily accepted : and I think we may say that we bore them with just the right mixture of humour and exasperation. But what surprises me, and at times dismays me, is the prolonged acceptance of some of these unnatural war conditions in time of peace. We have a good saying, 'Let sleeping dogs lie,' but need we make it a statute of the realm ? Have we forgotten that by long custom every one of us is allowed to have and keep a dog of our own called Freedom, and that we cannot let Freedom sleep perpetually if it is to remain alive. The law was that every such dog might follow his master everywhere, so long as he did not interfere with any other man's dog. There were also some official demands to be observed, but they were comparatively harmless. Are they still harmless ? No, for they are no longer needed to meet an extreme necessity. Is it still necessary to commandeer the land of England for vast roads and electric power stations, with the curt explanation that the engineers' instructions take no account of amenities ? Or, again, that you can, if you wish, appeal against the destruction of your garden, but it will cost you a hundred thousand pounds ! Forty years ago a whole countryside would march to save a threatened footpath : to-day we tamely agree that nothing can be done, and are thankful that the injury is not in our own neighbourhood—forgetting that every bit of rural beauty is the nation's, and that since the invention of the motor car the whole country is in our neighbourhood. Yes, decidedly freedom is sleeping ; we have become too docile, not too law-abiding but too tolerant of public works. If we cannot defeat them otherwise, it is time that we set up an Amenities Commission and gave the Chairman of the National Trust a place in the Cabinet."—*Sir Henry Newbolt.*

Charing Cross Bridge. An Englishman who has not seen London since the War must be vastly impressed by the many changes which have taken place. The proposals in connection with the removal of Charing Cross Station to the other side of the river involve so many changes in the centre of London that the right architectural conception of a scheme of this magnitude should be of the most vital interest to every citizen. For some time the proposals of the London County Council have been severely criticised by the professional architects, and various schemes have been put forward in elaborate sketches and in letters to the papers. The London County Council are being advised in regard to the general architectural form of their proposals by Sir Edwin Lutyens, the most representative architect of his day. We understand that the Royal Institute of British Architects does not approve of the Council's scheme, as architecturally conceived by Sir Edwin Lutyens. It is very difficult for the layman to visualise a scheme of this magnitude on paper, and the Council have very wisely produced a model, which is now on exhibition for public inspection. It is clear from this model that the architectural side has been conceived in its general principles with great vision. The criticisms of the scheme are, we understand, of the position of the station. Sir Robert Perks has addressed a Protest to this Society in regard to the hardship that would be suffered by the removal of the station to the other side of the river. There is certainly something to be said by the large number of people accustomed to being deposited from the far side of the river to within a few minutes of their offices near Charing Cross, who would then either have to walk across the bridge or take a motor omnibus. Such questions have nothing to do with the architect, whose duty it is to express the buildings in terms of design. If the Institute of British Architects considers the scheme so seriously wrong for London, the best way is for their best minds to get together and show the public in a model how they consider this great problem should be solved. Of course, all the criticisms in regard to the scheme could be overcome if the whole of the railway system were placed under the river. Such a solution would, of course, free a large area of most valuable ground for considerable financial development, but we are told that such a scheme is impossshle on account of the enormous cost. In these days, when cross-Channel Tunnels are seriously considered, we are surprised that such a solution is not possible.

Since writing the above we are glad to see that the Private Bill Committee has rejected the proposed site of the new terminus of the Southern Railway. This means, of course, the reconsideration of the whole scheme. Sir Samuel Hoare makes a valuable contribution in a letter in Saturday's *Times*, from which we quote the following :-

> "Could not the opportunity be taken, even at this late hour, of combining the new terminus with Waterloo, and of getting rid of one of the many stations that now impede the traffic and injure the amenities of London ? If we really believe in town planning and value beauty and distinction in our cities, we should seize this chance to remove at least one of the black spots in London, with the grim arches, gashes, and tunnels that they spread abroad. Surely one of the greatest achievements in city development is the concentration of stations and the approach to them by tube and electric power. Two termini are enough in New York. Why should the face of London be mutilated by four times as many ?"

Battersea. We have received the following letter from the Principal of Battersea Polytechnic : -

"DEAR SIR,

In connection with the article relating to St. John's College, Battersea, which appears on pages 559-563 of your Journal for April 4th, it may be of interest to your readers to know that the Governing Body of Battersea Polytechnic made very strong efforts to obtain St. John's College as an extension of the Battersea Polytechnic.

The negotiations with the London County Council, the Board of Education, the City Parochial Foundation and the Society for the Propagation of Christian Knowledge extended over a year, and at one time it was fully expected that the Governors would be successful in acquiring the property for Polytechnic purposes.

The newer part of the property was to have been used for Hostel and class room accommodation for Domestic Science, Housewifery and Hygiene and Public Health Training, and in this connection, probably, boarding accommodation for 200 students would have been arranged.

The Charity Commissioners had agreed to loan the Governing Body the money required for the purpose, but, after careful consideration, the London County

Council came to the conclusion that 'The property in question is too large and the additional cost involved too high for the objects which the Governors have in view.'

The beautiful old house referred to in your publication would have been used for residential purposes, and my Governors would almost certainly have had all the oak work generally restored.

It may also be interesting to you to know that, at the request of my Governors the Battersea Borough Council decided not to compete in the purchase of the St John's College property so long as Battersea Polytechnic were interested in it. Now, however, I am informed by the Battersea Town Clerk that the Borough Council have purchased the property and that all the buildings are going to be demolished I have, however, made an urgent request to the Town Clerk and many members of the Battersea Borough Council to be given the first option of purchasing all the old oak and the dial upon the house, if it should be broken up. It is now too late for my Governors to entertain any hope of acquiring the property itself.

Yours faithfully,

G. F. O'RIORDAN.

Principal."

We should like to point out to the Principal that, in our opinion, there is no value in the old oak, the staircase and the dial, except in their relation to the architecture of the house. We still do not believe that the Battersea Borough Council will demolish this house, and have written to the Town Clerk thereon.

* * *

Dorothy Perkins. The approach of Spring also reminds us that last Summer we were struck by the enormous popularity of this particular and very garish rose. Its strident colour and luxuriant growth seemed to overpower and oust all the beautiful types of roses which are so familiar to English cottage gardens On whatever background it spreads itself, it seemed to offend, and it became inseparably associated in one's mind with all the bungaloid growths which are disfiguring England. In an admirable article from a correspondent, as far back as July, 1920, *The Times* called attention to this particularly objectionable growth, and we feel we shall be doing a real service in quoting this *in extenso* :—

"DOROTHY PERKINS

TOO MUCH OF A BAD ROSE.

(From a Correspondent)

At this time of year England is a far more flowery country than it used to be even 20 years ago ; wherever there are gardens by the roadside, it is roses, roses all the way, but roses all of one kind, millions of them, looking as if they were made of cheap pink paper. If you have been passing between woods and suddenly come upon a garden, it is as if the silence were broken by whatever tune is now most popular, ground out on a piano organ. But there are several popular tunes at the worst of times, and now there is this one rose, Dorothy, Dorothy, all the way. It may be untrue that you can have too much of a good thing, but certainly you can have too much of a bad rose, and Dorothy Perkins is one. Nothing but the notion that any flowers are better than none, like the notion that any noise is better than none, will account for her popularity. Whether or not all wild flowers are beautiful, Dorothy Perkins is not a wild flower. She is a hybrid produced by man, and, worse than a hybrid, a mongrel. It is possible that her flowers, of a sharp, acrid yellow-pink, might harmonize with some leaves ; they do not harmonize with her leaves, and that is why she is a mongrel. She has the leaves of one kind of rose and the incongruous flowers of another ; she is always, except when first in bud, a discord ; and, when she is past her best, bad as it is, the discord is excruciating. A bed of nettles is beautiful compared with Dorothy Perkins in her decline, and it lasts much longer than her prime. Yet you see her defacing the porches of old farmhouses and the pergolas of artistic new ones. In all the back gardens by the railway she prevails ; she is the eyesore alike of cottages and palaces. There is nothing to be said for her except that she has ousted the Crimson Rambler as the novels of Miss —— oust the novels of Miss —— on the bookstalls ; and 'it is difficult to settle the proportion of iniquity between them.'

The Crimson Rambler, ugly at all times, has this advantage over Dorothy, that it is by nature suited to grow against a post, though the post is better without it ; but Dorothy, the child of the prostrate Wichuriana rose, and a disgrace to her charming parent, is also by nature prostrate, and, tied up to a pillar, looks like a drunken man clinging to a lamp-post. She is least intolerable when falling down a bank ; but there are dozens of other Wichuriana roses to be grown so, with less ridiculous names, and leaves and flowers both beautiful. There are Jersey Beauty and Shower of Gold and François Jurainville, all charming and all easily grown. In particular, there is Ruby Queen, a lovely rose, but not even listed by many rose-growers. Why has Dorothy prevailed over all of them ? For the same reason, no doubt, that Miss —— is on all the bookstalls and Mr. Hardy and Mr. Conrad and Mr. Hudson are not. But what that reason is we do not know. The nurseryman who produced Dorothy, let us hope by mistake, ought to have burnt the plant as soon as it began to flower. He has let loose upon our gardens a pest like the American duckweed or the rabbits of Australia. For, where Dorothy is, all beautiful flowers are outfaced. That particular acrid yellow-pink kills all other colours ; it seems to be in the limelight, while they are only in the sunlight. But the pest in this case is in the human mind, for, thank heaven, Dorothy does not seed ; she grows only where she is planted, but she is planted everywhere ; and she makes the most beautiful garden look like the scenery of a musical comedy. People must like their gardens to look like that. There is something unreal in Dorothy that delights them, something loud and platitudinous, like the style of Miss ——'s novels or the noise of a gramophone. So it is that we infect nature herself with our own vulgarity and make the earth an accomplice in our misdeeds."

Westminster Sacristy.—In the same number of *The Times* we read a leader headed " The United States and the Abbey," from which we quote the following remarkable reference to the Abbey as a sort of Valhalla of the English-speaking races. Will the Dean and Chapter favour the Royal Society of Arts with information as to the present position of the controversy in regard to the necessary adjustment of this historic building to fit it for the necessary ceremonial purposes of present-day usage ?

" Washington Irving wrote of Westminster Abbey in words so eloquent and so true that they are now the standard quotation, known to every British lover of the Abbey, and incorporated into every English guide-book. The American author knew that to call Westminster Abbey English, or even British, in any exclusive sense, is an error When the Anglo-American Oil Company, in their letter to the Dean, state that the Abbey " spiritually belongs to the English-speaking races," they say rather less than the truth. Historically, too, Westminster Abbey belongs to all of English stock. The Kings and Queens who were crowned there were the Kings and Queens of our ancestors, wherever our homes, and whatever our form of government may be to-day ; the heroes and great men who are honoured in that age-old memorial are the kinsfolk of all who come of English blood ; and the day which sees a statue of Abraham Lincoln unveiled in Westminster and £10,000 contributed by an Anglo-American house of commerce to the Westminster Abbey Fund, sees a mutual acknowledgment of a union that history herself can never dissolve

The practical effect of the Anglo-American Oil Company's munificence is to secure to the Dean of Westminster the £100,000 which he stated in his Appeal to be required for structural repairs in the immediate future. That point safely past, those who are concerned with the raising of the fund may, with a sigh of gratitude and of relief, turn to the task of reminding the public that at least £150,000 more is needed in order that, in the Dean of Westminster's words, the Abbey may ' be finally freed from the humiliating necessity of appeals being made now for this object, and now for that ' ; in order, too, that steady and continuous attention to the fabric may obviate the dreadful need of some future and drastic ' restoration.' "

Scientific Farming.—Professor Crew, Director of the Animal Breeding Research Department of Edinburgh University, gave a very interesting lecture last Wednesday, with Sir Daniel Hall in the Chair. His subject was " Genetical Methods of Livestock Improvement." There was a comparatively small attendance. The night before, Lord Beaverbrook was speaking at Hertford on " Fair Play for British Agriculture " to a packed audience and pointing out that the agricultural industry is just as important to the life of the nation as the manufacturing industry. When will the British farmer realise that this country has devoted large sums of money to supporting institutions for his enlightenment ?

Referring to the future, Professor Crew said there would be a very wide application of the facts of endocrinology to the problem of animal breeding. What was only at present attained by the slow process of selective breeding would be achieved in each generation by the administration of the appropriate endocrine product prepared by the biochemist. By these administrations growth, fertility and other important factors could be controlled. This control was already possible in the case of the rat and the mouse, but as yet there was no research institution in the country in a position to undertake the work if it were extended to cows, pigs and horses.

We hope Professor Crew will come again next Session, and tell us more of what eventually, in his opinion, science can do in the way of food production, eliminating altogether the need of the animal. At his best, we are sure he has scientific visions, which at least it is good to think may someday be possible.

Advertising.—A letter has been received intimating that the objectionable advertisements outside West Wycombe station cannot be moved as they are the property of the Advertising Contractors and the Railway has contracts with them. In view of the powers given under the New Act, it seems extraordinary that a great and rich railway board cannot take some steps in the interests of the public so that the coming summer months, when pleasure-seekers will be flocking through West Wycombe village to get to the beautiful country beyond, need not be offended by this terrible unsightliness. Will the Secretary of the Railway Company inform the Society what length of contract they have for these particular eye-sores?

Pylons and the Countryside.—Dr. Milestone of Cuckfield appealed to the Society to see if an electric overhead post could be so arranged as to avoid a very fine yew tree in her garden. A Fellow of the Society reported on this and we appreciate the following from the Central Sussex Electricity, Ltd.:

> " I thank you for your letter and would inform you that we are considering an alternative route for our mains which will avoid Dr. Milestone's yew tree, and I will write you again if any further question in regard to it crops up."

Ewell By-Pass.—The Society still has this matter under consideration, and two communications from Miss Glyn and Professor Wilden-Hart. We are trying to clarify the position for a clear judgment.

Inns and Hotels. So much is being said about the reform of English Inns and Hotels on the road that one cannot help also making a comparison between the service at English stations and those abroad. The other day we arrived in England from across the Channel at about 7 a.m., and some of the travellers repaired to the buffet for some refreshment before boarding the train Among them was a Frenchman, apparently visiting England for the first time. Imagine his horror at being told that all he could have was tea and a rather stale bun. He took some minutes to recover from the shock and then he was given a cup of very weak tea, half of which was spilt in the saucer. At almost every wayside station in France and Germany you can be served with hot coffee and rolls when the train stops for five minutes. This is all part of the same disease which hotel keepers and caterers suffer from all over England; one cannot say whether it is lack of ambition or a sort of divine complacency of the English character which is built on the motto that " What is good enough for my forefathers is good enough for me." But surely we have got past this stage and it is time they should make some effort, even if it were only to attract the tourist and for their own advantage. In the matter of food and catering—" O, that little more, how much it is "!

Art.—The Independent Gallery in Grafton Street is showing rather an interesting collection of drawings by Richard Sickert and Dunoyer de Segonzac. We must confess to being a little disappointed. Mr. Sickert is an artist whose work is always arresting and brilliant, but these were merely leaves from a sketch book, and in the case of both artists one was left with the impression that hardly any of the exhibits were on a level with their best work. Mr. Dunoyer de Segonzac has an exquisite economy of line and great vigour in his landscapes. We noted especially " La Grue," as an interesting impression.

Of Mr. Sickert's drawings perhaps the " Murder " stands out particularly, and we should like to see how the " Portrait of a Young Man " would develop as a larger picture. But all the time there is a sense of disappointment that a very great artist is giving his second best.

New Theatre Architecture in Paris.—As so many new theatres are springing up in London (as if it was not difficult enough to fill them already), it might be interesting in passing to comment on some of the new French architecture in this direction. Though there are not many actually new theatres being built, a great many are being done up and decorated on ultra-modern lines, and as French interior decoration is always just a little ahead of us in modernity, it is interesting to note the developments. Perhaps the Théatre Henri IV is one of the newest, and the most striking thing about the auditorium is some very interesting diffused lighting from the ceiling. Instead of the plain veiled square with a light above, which we use, there is a large square opening with graded steps almost like a square dome with the lighting fading from orange to white. This gives an effect of an open ceiling and yet a very soft light. The plain silver lighted panels on each side of the proscenium were a failure, though the idea was good. Outside in the foyer the walls were white, the carpet plain red and the chairs of the new steel furniture type, all tubular ; the lights were also in steel tubes looking too much like drainpipes to be really effective. The new Théatre Pigalle is also wedded to the steel fashion, but the outside is very effective and the lighting beautiful. The almost brutal plainness of decoration - rather a contradiction in terms—shows up every accessory to an alarming extent, but because everything is so conspicuous let us hope that we are coming to an era of really beautiful form in the smaller things of life and that the steel furniture phase will have a short life. Though the new Folies Bergère building is now about four years old its striking facade still remains one of the best examples of modern theatre work in the city.

Drama.—PARIS THEATRES. An Established Success and a New Comedy.—It is now common knowledge that " Le Sexe Faible," by Edouard Bourdet, is one of the cleverest and most successful comedies that has been produced in Paris for many years. Everyone has flocked to it and it is still almost weeks before one can get a ticket. This tremendous publicity and praise is well deserved. We can say almost without reserve that it is one of the wittiest and best acted comedies we have ever seen. One can hardly find a flaw in the players or the playing. It has the essence of French charm and an exquisite lightness of touch. This play supplies the final answer to the question as to why French plays can never be successfully translated into English, for this comedy with all its charm and wit would be utterly impossible and unthinkable as a translation. In this case it is not for the reasons usually brought forward, for there is hardly a censorable line, but it is just an entirely Latin idiom and as such has no relation to the Anglo-Saxon tongue. We mention this in case some rash person, blinded by the success of the play in Paris, might try to put it on the English stage. It is impossible to refer to individual performances except perhaps that of Marguerite Moreno who gives a brilliantly funny performance of an elderly lady with young ideas.

Another charming but much quieter comedy is being given at the Théatre Henri IV, " Etienne," in which clever Marthe Regnier plays the leading part. It is a very simple little play about a bourgeois family and though there is not much incident it holds the audience throughout. The boy's part, of a rather " Young Woodley " type, is cleverly written and not overdone. Marthe Regnier plays the mother brilliantly.

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Modern Buildings.—All great cities are becoming very much alike in a greater or less degree as they follow the trend of modern simplicity and necessity. The city dweller becomes more and more like his neighbour and more and more buildings are needed on the mass production scale. Everywhere flats are replacing houses and " every modern convenience " is crammed into a little apartment of two or three rooms. Therefore we must realise that the beauty and efficiency of the city of the future lies chiefly in its planning of big offices and flats, and building must be done for the thousands and not to suit any individual fancy. New York of necessity started this idea, which is really only adapting architecture to modern progress, and now Paris is rapidly following suit, while London follows a little half-heartedly behind. London, somehow, seems to look back over her shoulder rather more than the others and to regret the older and quieter days ; therefore her buildings are rather uncertain and unconvincing.

Paris is going ahead tremendously in this respect and the new blocks are really very beautiful and suitable. But the most interesting comparisons are to be found in the suburbs. Suburbs altogether are an unnatural state of things. The real country dweller finds it hard to be vulgar in his building for there is usually a sort of affinity with the land that makes for a certain repose and dignity, but it is in the suburbs that all the horror of modern individual architecture is let loose, and in the last two years the suburbs of Paris have developed almost as much as those of London and on almost the same untidy lines. Here are " bungaloids " and fancy stone and imitation half-timbering, untidy advertisements and all the diseases bred on the outskirts of the modern city. Here the individual minds give rein to their fancies and the jerry builder turns them into fact. There are rows of what are called " coquettes petites villas " and gigantic petrol stations in all manner of garish shapes and colours. There are, of course, one or two particularly interesting exceptions and certain areas show the influence of Corbusier and his ideas, but one can only think that the more the cities are simplified the more the suburbs are complicated, because individual taste (or the lack of it), must have an outlet. It would be interesting to see the developments in another fifty years at the rate things are moving at present.

NOTICES

DOMINIONS AND COLONIES SECTION

MONDAY, APRIL 7th, 1930. LIEUT.-GEN. SIR WILLIAM FURSE, K.C.B., D.S.O., Director, Imperial Institute, in the Chair. A paper entitled " The Empire Canning Industry " was read by SIR EDGAR JONES, K.B.E., Chairman, Empire Canning Council. The paper and discussion will be published in the *Journal* at an early date.

TWENTIETH ORDINARY MEETING

WEDNESDAY, APRIL 9th, 1930. SIR DANIEL HALL, K.C.B., D.Sc., LL.D., F.R.S., Director, John Innes Horticultural Institution, in the Chair. A paper entitled "Genetical Methods of Live Stock Improvement" was read by PROFESSOR F. A. E. CREW, M.D., D.Sc., Ph.D., Director, Animal Breeding Research Department, University of Edinburgh. The paper and discussion will be published in the *Journal* on June 13th.

PROCEEDINGS OF THE SOCIETY

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INDIAN SECTION

FRIDAY, FEBRUARY 7TH, 1930

SIR DAVID T. CHADWICK, C.S.I., C.I.E.,
Secretary, Imperial Economic Committee, in the Chair

THE CHAIRMAN, in introducing the lecturer, said that less than a month ago Sir Thomas Holland, the late most distinguished head of a distinguished Service, the Indian Geological Survey, delivered the Trueman Wood Lecture and reviewed the international position in minerals and especially the position of the British Empire, at the same time indulging in some speculations as to the use of these resources in peace and war. The lecturer that evening was another experienced

member of the Indian Geological Survey and would direct himself more particularly to the mineral resources of India. He had wide experience of many of the minerals found in India, and more especially mica, monazite and oil, and was now adviser on minerals to the High Commissioner for India.

The following paper was then read :—

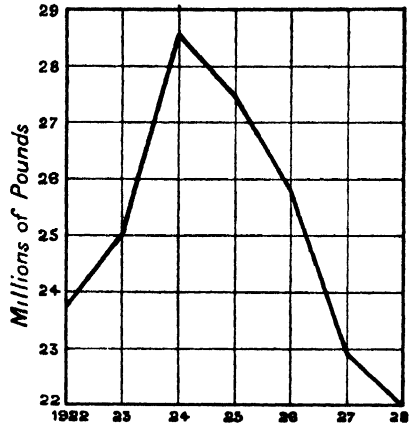
RECENT MINERAL DEVELOPMENTS IN INDIA

By G. H. Tipper, M.A., F.G.S., M.I.M.M.,
Late of the Geological Survey of India

I feel that I cannot better introduce this paper than by attempting to give some idea of the present state of India's mineral production. I hope by so doing to bring to notice certain interesting points. The mineral products of India fall into two categories :—(*a*) those which are chiefly exported in the raw state, so assisting this country and other countries abroad to build up important industries, and (*b*) minerals which are utilised or refined in India, forming the basis of industries of greater or less importance, the products from which may be partly exported and partly used in the country itself. The minerals which fall into the latter division are no doubt of greater value to a country than those which are exported. India, however, is not yet sufficiently advanced industrially to make use of more than a small proportion of its natural mineral resources. Of the minerals which are exported, manganese, mica, tin, &c., may be mentioned, while iron ore forms the raw material for the iron and steel industry. As a geologist I am naturally interested in the occurrence of mineral deposits, and it is chiefly this point of view that I shall deal with in this lecture.

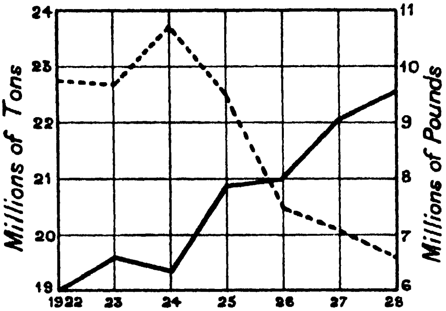
The present position of the mineral industry can be best explained by statistics, and those which I am using are prepared by the Geological Survey of India. In the year 1928, the last year for which complete figures are available, the value of the mineral production was £22,036,772. This figure represents a decrease of 3.9 per cent. from the total of the previous year. It is, however, over £6,500,000 less than in 1924, when the total was £28,634,996. The curve of total production for the years 1922-28 is shown in Figure 1. A decrease in value does not necessarily mean diminished output. A lowering of prices of important products may easily account for the decrease and the variations in value are not always an infallible indication of the state of the industry. In fact, the extraordinary decrease in value noted is more than accounted for by the drop in price of two of the chief products —coal and oil. Coal has shown a fairly steady increase in output from just over 19 million tons in 1922 to 22½ millions in 1928. The value increased during the period 1922-24 from £9,750,000 to a little over £10,750,000 stirling. Since 1924, the value has steadily decreased until it was in 1928 only a little over £6,750,000. These relations are shown graphically in Figure 2.

The output of oil showed a regular decrease from 298 million gallons in 1922



Total value of India's Minerals From 1922-1928

Fig. 1.



Output—— Value---- of Coal From 1922-1928

Fig. 2.

to 280 million in 1926; the value, however, remained fairly steady at over £7,000,000. From 1926, the output increased by a slight jump in 1927 to 281 million gallons, and in 1928 by a decided leap to almost 306 million. The value decreased in 1927 to £4,421,468, while, in spite of the output of 1928, the value decreased still further to £4,314,207. The lowering of values in 1927 and 1928 was due to rate cutting during the petroleum war. These facts are shown graphically in Figure 3.

Continuing the survey of some other principal minerals, manganese ore to the amount of 474,000 tons was produced in 1922. The output increased until 1927, when the total raised was 1,129,353 tons, the largest in the history of the industry. In 1928, the output decreased slightly by about

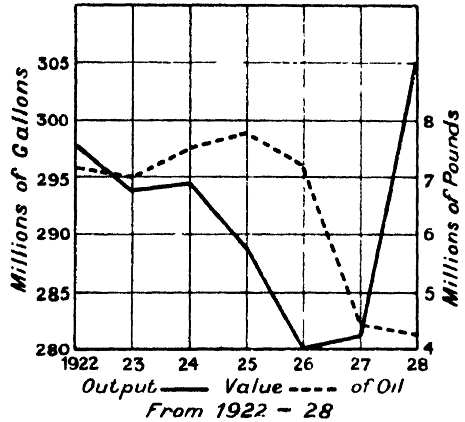


FIG. 3.

150,000 tons. As, however, manganese ore is chiefly raised for export, the shipments during this period give a better idea of the variations of trade than the output. Strangely enough, in 1922 almost 400,000 tons were shipped in excess of raisings; in 1923, shipments were again in excess of production by 155,000 tons. Since that year, production has been in excess of shipments, and if we assume that stocks had been exhausted by the excess shipments of 1923, there is now an accumulation of almost one million tons of manganese ores (of all grades) at the mines. The ore it contains is sold according to the percentage of manganese (there are certain other factors which are taken into consideration). The variation in the c.i.f. price per unit of manganese explains some, but not all, of the facts. During the period 1922–1924, the price rose from almost 14 pence to nearly 23 pence per unit. From 1924, the price has steadily decreased, and is now lower than it was in 1922, and at present shows no signs of improvement. The figures relating to manganese are shown graphically in Figure 4. I shall return to this mineral later.

The mica industry has always been a peculiar one in that the output and export figures can never be reconciled. In 1928, for example, the exports were rather more than double the output, and in 1926 and 1927 were very nearly double. This state of affairs is usually considered to be largely due to the prevalence of theft. Other contributory causes are to be found in the working over of old waste dumps and shallow workings by contractors who probably make no returns. These are, however, of small account, as anyone who has spent much time in the mica field knows well. Taking the export figures as more truly representative of the trade, shipments show very considerable variation—43,145 cwts. in 1922 increasing to 83,000 in 1923, decreasing slightly in 1924, to reach a maximum of almost 100,000 cwts. in 1925, since when it has decreased, to increase again in 1928. The total value rose from £385,000 in 1922 to £820,000 in 1926, dropping

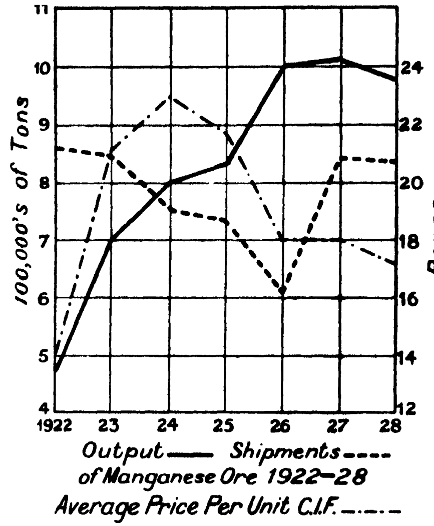
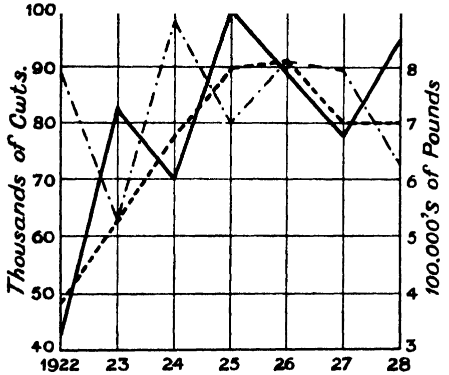


FIG. 4.

again in 1927 to £691,000. In 1928 it was £698,130. During the same period the value per cwt. shows interesting features, being lower when the shipments are greater. This seeming anomaly is due to the fact that although the value per cwt. of all classes of mica taken together has shown the variations shown in Figure 5, the value of block mica has increased, while that of splittings has decreased. The explanation of the variations in the curve of value is that the increased output noted in the years 1923, 1925, and 1928 is due to the greater weight of splittings shipped and hence the average value per cwt. is less in those years.

The production of iron ore shows a progressive yearly increase during this period, from a little over 600,000 tons to just over 2,000,000 tons. The value has increased from £100,000 to £400,000.

Except for a few ounces produced in other parts of India, gold is represented by the output from the Kolar Gold Fields in Mysore, the Anantapur Mine in Madras having ceased operations in 1925. The output of the field has shown a steady decrease during the period under review from 429,559 ozs. valued at £1,851,577 in 1922, to 375,886 ozs., valued at £1,588,252, in 1928. The Champion Reef and Ooregum Mines are amongst the deepest in the world—6,689 and 6,465 feet respectively. Mining at such depths brings problems of great difficulty. Among them may be mentioned ventilation, the underground temperature being 117° F. The rocks are in a state of strain, giving rise to "rock bursts" of great violence. There is every occasion to hope that the output from this field will be maintained. The following facts about the field



Exports —— Value ---- of Mica
From 1922 - 28
Variation in Value Per Cwt. — — ·

FIG. 5.

from the inception of gold mining are interesting: gold produced to the value of £68,738,192 from 23 million tons of quartz crushed, dividends paid £21,851,744, while royalties amounting to over £3,000,000 have been paid to the Mysore State. It has been, and still is, a wonderful small field.

Contrasted with gold, the other so-called precious metal, silver, shows an ever-increasing output. A small amount, about 20,000 ozs., is obtained during the refining of gold at Kolar. This amount is only .02 per cent. of the total, the great mines at Bawdwin being responsible for 7,404,728 ozs. in 1928, increasing to this total from 4,205,584 ozs. in 1922. During the period the price of silver has gone down very considerably, due very largely to the adoption of a gold standard by India and to political troubles in China. The outlook is very uncertain. The Bawdwin mines also produce lead, zinc concentrates, copper matte, antimonial lead and nickel speiss, most of which show substantial increases in output.

The copper matte produced at Bawdwin is shipped to Hamburg for treatment. Copper is, however, now being produced from the Singhbhum Copper belt in Bihar and Orissa, at the Mosaboni mine. The erection of a new plant to deal with concentration, smelting and refining has been finished at Maubhandar, Ghatsila. Copper bars of high quality are now being produced, and there is in contemplation the erection of a rolling mill for the making of sheet. India imports large amounts of copper and there is a market ready to hand for the products of the company.

The production of tin ore remained round about 2,000 tons from 1922-1925, increased to 3,500 tons in 1926 and 1927, but dropped again in 1928 to 2,780 tons. In other words, the output has very closely followed the variations in the price of tin during the same period.

Wolfram is a mineral which shows a definite tendency to decrease in output, and it may not be putting it too strongly to suggest that, if a certain amount of wolfram did not occur with tin, no wolfram would have been produced in India during recent years, the price not being sufficiently attractive. It would appear that the Chinese deposits are now a controlling factor in the world's wolfram market, due to easily worked deposits.

There are, of course, other minerals produced in India, but I have, I think, drawn attention to some of the most important. I should like to consider for a moment the provincial contributions to India's mineral industries. Burma, with its oil, silver, lead, zinc, tin and wolfram, is responsible for 36% of the total value. Bihar and Orissa with coal, iron ore, copper and other minerals, provides 23%. In tonnage, however, Bihar and Orissa is easily first. The Central Provinces (manganese) 8.6%, Mysore State (gold and chromite) 7.8%, Bengal, with the remnant of the old Bengal coalfields which still belongs to it, 7.6%, are a very long way behind.

This seems a convenient point at which to make a comparison with the mineral industries of other countries, and particularly with other parts of the Empire. If we take the first five minerals in order corresponding to the value of the output, coal, petroleum, manganese, lead and gold, the output of coal is about 1/12th of the output of Great Britain. It is, however, greater than the output of Canada or Australia, or any of the other Dominions or Colonies, and is greater than that of many European countries. India's contribution to the world's petroleum output is less than .75% of the total. But India, Trinidad and Canada are the only Empire producers and as such even India's small contribution might in certain eventualities be of importance. With regard to manganese, India at present holds her own, and is the most important producer in the Empire. Increased competition from the West African mines and from the Postmasberg deposits in South Africa, also Empire sources, is certain to cut into the Indian trade. The lead produced in India is about 7% of the world's production. India's gold is only 2% of the world's output, and is far overshadowed by the supplies from South Africa.

With regard to some of the other mineral products, the Canadian production of silver is much greater than that of India. Southern Rhodesia dominates the world's suppy of chromite. In iron ore, India is the second producer in the Empire, and there is very little doubt that her exceptionally large reserves of iron ores form an asset of great potential value. Indian muscovite mica has always held a leading position in the world's supply. The production of sheet mica as block and splittings is about 65% of the total. The extension of electrical industries throughout the world makes mica, for which no efficient substitute has yet been discovered, a very important mineral. There are, of course, other minerals of potential importance, but I have said enough to show that, unimportant as India's minerals may appear when compared with the great producing countries, some of them are, nevertheless, by no means negligible, and are an asset not only to India but to the world in general.

Throughout the world geological investigations are continually in progress.

New processes for the utilisation of metals, improvements in metallurgical treatment and in the separation of minerals from the matrix are constantly being tested. Attempts to produce metals, hitherto only known in the laboratory, on a commercial scale are in progress. An industry may progress at the expense of another. The imposition of tariffs may be the cause of important changes in the mineral industries. The effects of any one successful experimental process may be world-wide in its incidence. It is, for example, not too much to say that the flotation process with all its ramifications has been a most powerful factor in the mineral industry in recent years, and has led to the exploitation of many deposits which, without its aid, would have remained untouched. The astounding increase in the production of chromite is due to the extensive use of chromium alloys in the form of rustless irons and steels.

India has its own mineral problems, and I should like to draw your attention to some of those which seem to me important. As the present Director of the Geological Survey of India says, the fuels are the most critical of all minerals, and no country can hope to build up important industries without adequate supplies. So far as coal is concerned, India is fairly well off. The reserves of coal are sufficient for many years to come. The formation of a Coal Grading Board four years ago, with its certificates of quality, has gone far to rehabilitate Indian coal in the Eastern markets. The exports have recently shown a gratifying increase, while the imports of coal and coke have fallen. The amount exported is, however, still below that of some years ago.

The question of soft coke, the " poora koila " of the coalfields, is now to be examined by a Committee recently appointed. The provision of a cheap, smokeless fuel, which could replace cow-dung as a domestic fuel and thus release a valuable manure, is certainly an important problem. Soft coke has been made in the coalfields for many years, generally in the crudest fashion. The amount has been estimated at 400,000 tons. The possibility of some form of low temperature distillation with the recovery of bye-products is in this connection worthy of consideration. I should like, however, to point out that, in my opinion, soft coke, if it is to replace the ordinary fuel in the country, must not only be smokeless ; it must be very cheap and, in addition, readily available at many centres

There is one problem connected with Indian coal and affecting also the iron and steel trades which invariably crops up, and that is, the problem of the future supplies of metallurgical coke The known reserves of coal capable of producing metallurgical coke are quite inadequate for the future requirements of the iron and steel industry. Experiments in coking mixtures of non-coking and coking coals from different seams have been fairly promising and have shown that reasonably good second-class coke can be thus produced. The reserves of iron ore in the rich fields of Bihar and Orissa are very large, and a great deal of the hæmatite is in very fine powder, which is at present useless under blast furnace conditions. The best solution of the problem would be the utilisation of some method of smelting independent of coke and with the iron ore in a state of fine powder.

The iron and steel industry would then be freed from the problem of the reserves of coking coals and would eventually use up ore at present useless

With exhaustive geological investigation as time goes on, the chance of discovering a new oilfield in India and Burma becomes more and more remote. The main problem before the oil producer is how to keep up the present supply and keep the refineries working. It would appear that the Yenangyaung field has passed its zenith and is now on the decline. Its life may be prolonged if the deeper sands prove remunerative. The question which has to be faced is that of the large amount of oil which is left in the sands after the usual methods of winning oil have ceased to be effective. No doubt the relative merits of repressuring and suction will have been carefully examined. Whether these methods of treatment will definitely increase the yield of oil, or whether extraction will be merely accelerated, does not appear to be definitely settled. In the end, the only method of winning oil will be to go down and mine it. A proposal to exploit certain areas in Thayetmyo in this way has been under consideration, and the outcome will be watched with great interest. The mining of oil is not by any means new. It has been successfully employed in Alsace for many years. If, and when, mining for oil becomes universal on the depletion of the sands by present methods, the cost of production is bound to increase and the way may be opened for the utilisation of the large reserves of oil shales with which Burma is quite well supplied.

One of the problems of the iron and steel industry has already been touched on when speaking about coal. Another is competition. At present, competition is being fought by tariffs, which means that the Indian steel could not compete in an unrestricted market.

It would seem that India is in danger of losing its best customer for pig iron – Japan. The Japanese have recently contracted to obtain up to one million tons of iron ore yearly from Australia, and I take it that they intend to make themselves independent of imported pig.

An experiment of considerable interest and also of considerable cost has been going on for the past few years in Mysore. A plant was built at Bhadravati in the Mysore State for smelting the Bababudan iron ore, using charcoal as the fuel. The plant, for which an estimate of 50 lakhs was originally given, eventually cost about 2 crores. The wood for charcoal is obtained from adjacent forests and the distillation plant is on a very large scale. The by-products of the distillation are acetate of lime, methyl alcohol and wood tar, the revenue from which is an important offset against the high cost of the charcoal pig iron. The blast furnace has a maximum yearly output of 28,000 tons, and if this could be readily disposed of at fair prices, the question of maintenance would be solved. There is difficulty in disposing of the pig-iron and the provision of a modern pipe foundry has not yet solved the problem. It is greatly to be hoped that the venture will yet win through.

The consumption of manganese ore in the Indian iron and steel industries is small, about 40,000 tons yearly. A certain amount of ferro-manganese is made and some exported, about 4,000 tons yearly. It is sometimes stated that India suffers potential loss from the fact that all her exports of manganese consist of ore in the raw state. Like many other statements, this is only partially true. Not all manganese ore is suitable for making ferro-manganese, and even if the greater part of the suitable ore were so converted, there would still remain a large exportable surplus. The fact, however, must be faced that almost all the ore is raised for export, and at present the Indian ore is suffering from severe competition and falling prices. The key to the situation is at present in the hands of the Russians. Before the war, Russia was the principal producer. During and for some time after the war, the Russian output shrank to small proportions, and India became the chief producer. During the war the West African deposits were discovered. Recently the South African manganese at Postmasberg has been extensively boomed. With the termination of the Harriman concession, the Soviet undertook the mining of Russian manganese with the avowed intention of obtaining a market by depressing prices. Aided by the present widespread competition (there are no less than 35 producing countries) they have achieved their wish. The Russian output and shipments have enormously increased. With the conditions prevailing under the Soviet regime, the cost of production is next to nothing, and manganese ore can be placed on the market at prices with which India cannot hope to compete. With the Russian output there is now over-production and, consequently, the ore which has to pay heavy freight and rail transport charges is that which is most easily affected. This is certainly the case with the major part of India's manganese. For how long Russia will be able to keep up her uneconomic competition it is quite impossible to say.

The importance of mica has grown with the electrical industries in which the physical properties of the mineral as an insulator are fully utilised. Indian mica belongs to the variety known as muscovite, and occurs in coarsely crystalline rocks, the pegmatites. The rough crystals of mica are known as "books," an apt term. The chief mining areas are in and around the Kodarma Forest, Bihar and Orissa, and in the Nellore district of Madras and different localities in Rajputana. Mica differs from most other kinds of mining in that it is the quality of the product which is of importance and not the quantity. Owing to the irregular distribution of the mica in the pegmatites it is essentially a hazardous enterprise, and the output is kept up mainly because of the numbers of pegmatites available. The wastage in mining and during preparation for the market is very large. Generally speaking, any one mine will produce all qualities and many sizes, but the smaller sizes will always preponderate, and it is on these that the prosperity of the industry very largely depends. It is certainly a fact that the larger sizes are more rarely come across now than they used to be.

The "books" of mica are split into convenient thicknesses and are further trimmed by the sickle or the shears. The former method gives what is known as "Bengal" trimmed mica, the sickle being used to cut out cracks and flaws to leave an irregularly shaped piece of sound mica. With the shears, thinner pieces are usually cut roughly rectangular. This latter method is being gradually replaced by sickle trimming. The mica block is sized according to the largest number of square inches which will fit as a rectangle into the irregular outline. The mica is classified as clear, slightly stained, heavily stained, etc. It is this which constitutes the block mica of commerce.

At the present time, the major part of the Indian mica is put on to the market in the shape of " splittings." " Splittings " are prepared from small-sized block mica and, as their name implies, advantage is taken of the very perfect cleavage characteristic of mica, in their preparation. The quickness and certainty with which the Indian labourer (armed with a sharpened pointed dinner knife) will strip off film after film, with no variation in thickness, is literally amazing. Some idea of the increase in " splittings " is shown by the fact that in 1926 the weight of " splittings " exported was five times as much as the weight of " block mica," and in 1928 seven times. These " splittings " form the basis of reconstructed mica, usually known as " micanite," the films of mica being bonded together by a suitable cement, often some preparation of shellac. In this way not only sheets of large size can be constructed but also cylinders and other curved shapes can be formed. It is peculiar that the making of " micanite " in India has not been successful, although it produces the necessary mica and has a monopoly of shellac.

The waste in mica mining is great and the accumulations amount to a very high tonnage, which is constantly increasing. From time to time attempts are made to utilise this scrap. There is a promising field in the preparation of ground and powdered mica which can be made use of in many ways. The physical properties of the mineral make it exceptionally difficult to grind. The serious efforts now being made in this direction will be followed with every hope for their ultimate success.

The marketing of mica has always been a problem, particularly for the small producer. His output consists of several sizes of different grades. He is unable to estimate beforehand his probable output. He cannot afford to wait until he has accumulated considerable quantities of the different sizes and grades. He is practically forced to sell to a dealer who is in touch with the markets and who can place the mica among the different interested firms with whose requirements he is acquainted. Unfortunately, the very nature of the mineral makes sharp practice easy, and the buyer does not always get the sizes and quality he expects. Mica has a really bad name. Probably a buyer at the mines would be able to check his purchasers more effectively, and it is becoming more and more the practice for interested firms to buy their requirements locally.

In the autumn session of the Bihar and Orissa Legislative Council a Bill was introduced the purpose of which is to attempt to reduce the losses occasioned by theft by licensing miners and dealers. There was a good deal of opposition, but the Bill has been referred to a Select Committee.

The present position of the mineral monazite forms a good example of the change which may take place when one industry supersedes another.

In 1909 it was discovered that the beach sands of Travancore contained the mineral monazite. Monazite is a phosphate of the cerium earths, and owes its importance to the fact that it contains a valuable percentage of thorium as silicate. From the latter is prepared, by a complicated chemical process, thorium oxide, the important constituent of incandescent mantles for use with gas and oil.

The monazite occurs as rounded grains of a clear honey yellow colour, and has as associates magnetite, ilmenite (titaniferous iron ore), zircon, garnet, calcite and quartz. The action of the waves on the sloping beach has caused the heavier minerals of the sands to be naturally concentrated, the minerals of approximately the same density being found in close association. These concentrated sands vary in colour, are usually black from the preponderance of magnetite and ilmenite, sometimes yellow when there is excess of monazite and occasionally red where the garnets preponderate.

The separation of the monazite is a comparatively simple process magnetically. The accessory minerals were in the early days thrown away as useless. The percentage of thoria in the separated monazite varies from 6 to 10, and as this is higher than in other known deposits of monazite it was confidently expected that Travancore would become the important source of the mineral. This confidence was justified.

Recently, however, there has been a decided change. The large increase of the use of electric light has seriously affected the output of monazite, as the following figures will show :—1920, 1,641 tons ; 1921, 1,260 ; 1922, 125 ; 1923, 246 ; 1924, 622 ; 1925, nil ; 1926, 64 ; 1927, 280 ; 1928, 103.

As the use of electricity for lighting purposes is not likely to decrease, it would appear that the use of thoria and, therefore, of monazite is bound to become less and less. Thoria is, however, one of the radio-active substances and there is a gleam of hope that meso-thorium may possibly replace radium in luminous paints and so release a substance of value for its therapeutic uses. The cerium earths forming such a large proportion of monazite have only a limited use in the arts. The metal cerium forms part of the pyrophoric and other alloys. It is used in certain optical glasses and to a certain extent in its salts medicinally. The stocks of cerium earths already in existence can no doubt supply these manufactures for many years to come. Any discovery leading to the extended use of either the cerium earths or thoria might easily lead to the recovery of the monazite industry.

Although monazite is rapidly decreasing in its industrial uses, there are signs that some of the accessory minerals with which it is associated are becoming of considerable industrial importance. These are ilmenite (titaniferous iron ore) and zircon. Ilmenite contains, if pure, 52% of Titania, the oxide of Titanium. The amount, however, varies between wide limits in the naturally occurring mineral. It has been found that titania (the oxide of titanium) makes a valuable white pigment of great covering power, non-poisonous and unaffected by atmospheric conditions. The output of ilmenite from Travancore has increased to a considerable figure, amounting to 17,000 tons in 1927 and 25,307 tons in 1928.

Zircon—the silicate of zirconium—occurs as water-clear crystals of small size and they amount to as much as 12% in some of the sands. The oxide of zirconium (zirconia) is a very valuable refractory. The outputs for the years 1927 and 1928 have been 1,465 and 855 tons respectively. There is reason to hope that the extended use of these minerals will lead to the continuance of industries originally founded for the separation of monazite.

A most interesting piece of research has recently been carried out on the presence and purification of helium in monazite. This light, non-inflammable gas is present to the extent of one cubic centimetre in one gramme of the mineral. The treatment of 100 tons of monazite will give 100,000 litres of helium (or 3,700 cubic feet) which have previously been allowed to escape. Up to date helium has only been found in quantity in some natural gases in the United States of America, where it is separated and used for filling lighter than air flying machines. It will require something of the order of one and one-third million tons of monazite to supply sufficient helium to fill a ship like the R101 and such a volume does not seem easily obtainable. Nevertheless, the advantages of the gas are so great that efforts to get the necessary supplies will no doubt be made.

A development at present small but which may have considerable technical application is that of the aluminous refractories, sillimanite and kyanite. The story of the discovery of sillimanite rock in apparently large quantities is worth recounting. During, and after, the war, corundum, the massive impure form of alumina, was shipped from the Khasi hills in Assam for use as an abrasive. In 1921, the firm who were handling the mineral noticed a decided difference in the hardness of the material and suggested that the mineral was no longer corundum but sillimanite. This was confirmed by Dr. C. S. Fox, of the Geological Survey of India, then attached to the Indian Trade Commissioner's office in London. He pointed out that sillimanite, being a refractory of importance, might be more valuable than the corundum. The value of sillimanite results from its great strength and toughness, high melting point, stability up to that point, its low coefficient of expansion and resistance to corrosive non-metallic slags. A rock composed of sillimanite can be used direct in furnaces. Sillimanite is a silicate of alumina (Al_2O_3, SiO_2) and is polymorphous with two other naturally occurring minerals, andalusite and kyanite, of the same composition. Andalusite does not occur in any quantity in India so far as is known at present. Kyanite is known to occur in large quantities, and this mineral when heated undergoes a considerable change in volume, and cannot, therefore, be used direct in furnaces. It must be first crushed and calcined before use as a refractory. It is now known that when sillimanite is heated it changes to a substance of the composition $3Al_2O_3$, $2SiO_2$ called mullite and a silica glass above a temperature of 1545° C. Kyanite is also found to change to mullite and a silica glass but at a slightly lower temperature. It would appear, then, that it is the mullite which is the important refractory and also that the amount of silica glass could be reduced by adding excess alumina (bauxite) and the result would conform more closely to the composition of mullite.

Deposits of sillimanite of high grade occur at Sona Pahar, in the Nongstoin State, Assam. Sillimanite rock of lower grade occurs extensively near Pipra, in the Rewa State of Central India. From the first, material of sufficient purity to be used directly as a refractory can be obtained. The Rewa deposits, although of large extent, are impure, and good material would require separation. Both localities are situated far inland and in both cases transport charges would be heavy.

Kyanite occurs very extensively in Bihar and Orissa, at Lapsa Buru, Ghagidih and the Rakha mines. These deposits are much more favourably situated and transport charges would not be so heavy. At the same time, it must be pointed out that kyanite cannot be used directly as a refractory but must be crushed and calcined before use. Kyanite rock is, however, much less tough than sillimanite and more easily worked.

The prospects for the increased use of aluminous refractories appear to be favourable, and should be of particular importance to the ceramic industries and in glass manufacture.

The search for new mineral deposits is continually proceeding, and the extent of the search can be judged by the number of prospecting licences granted each year. The number taken out in 1922 was 562, rising to 738 in 1925, dropping to 605 in 1927, while in 1928 the number was only 396. Over the same period the number of mining leases granted varied from 110 in 1922, rising to 141 in 1926 and dropping to 101 in 1928. Arranging the prospecting activities according to provinces, the Central Provinces showed the greatest number of prospectors over this period, closely followed by Burma, which in 1928 headed the list. Bihar and Orissa, which, geologically speaking, ought to be worth prospecting, is very low down in the list, being beaten by Madras, Assam, the Punjab and, more recently, Ajmer Merwara.

The most sought for minerals are manganese, tin and wolfram, fuels, mica.

I have, I am afraid, wandered over a wide field without paying strict attention to my title. If I have interested you and said enough to stimulate a discussion, I shall have achieved my object.

Finally, I should like to express my indebtedness to the members of the Geological Survey of India whose recently published papers and articles have been largely drawn upon.

DISCUSSION

THE CHAIRMAN said the Society was greatly indebted to the lecturer for a very interesting survey of the mineral production of India. What struck one particularly was the variety of minerals produced. There were two rather depressing notes which ran through the lecture. In spite of the great variety of Indian minerals there had been a pronounced falling movement in prices, which was not restricted, of course, entirely to India. The other point was the anxiety about the coal reserves. That was often mentioned in regard to India, and made one wonder whether with her resources of other ores the time would come when she would export ore instead of smelting it for herself. It would be interesting to know to what extent research was going on either in India or, perhaps more profitably, in conjunction with institutions in this country and elsewhere in Europe, to utilise the low grade coals of India to make them more useful than they had hitherto been.

The lecturer made no mention of bauxite, although that was often referred to when the possibilities of the development of aluminium were discussed. He wondered whether with the development now going on in the Punjab in hydro-electricity there was a prospect of development in that direction.

SIR RICHARD REDMAYNE, K.C.B., said the lecture was valuable, coming as it did after the brilliant address delivered to the Society a short time ago by Sir Basil Blackett, who expressed his belief that the economic prosperity of England was bound up with the increasing economic prosperity of India. He thought the lecturer that evening had shown how true that was. One had only to take the case of manganese, for example, which was so important to Britain in time of war. If the supplies of Russia and Asia Minor were shut off, this country was dependent on India and South and West Africa for its supplies of manganese, and more on India than anywhere else for making manganese steel. The same applied to nearly all the minerals the lecturer had mentioned.

With regard to mica, there were two different systems of classification, the Indian system and the American system. Some time ago the question was investigated by the Imperial Institute to see whether a single system of classification could not be arranged with a view to improving the marketing of mica. Leading dealers in mica and others were consulted and differing opinions expressed, and in view of the difficulties encountered the project was abandoned. He would like to know the lecturer's opinion on the point, for if a single system of classification could be introduced applicable to mica wherever produced, it would conduce to simplification in marketing the commodity.

He was particularly interested in what the lecturer said about coal and the probability of the application of low temperature carbonisation. If low grade coal were to be utilised to the best advantage one of two methods must be adopted. It must either be utilised in the pulverised form, which allowed it to be burned to much greater advantage than in the lump state, or it must be treated by low temperature carbonisation. The lecturer had referred to the exhaustion, probably within a short time, of the better grade coking coals. In the majority of cases, and by the great majority of processes, low temperature carbonisation did not lend itself to the manufacture of a metallurgical coke, but there was one process which did do that, and which he had seen at work at Essen in Germany. That process produced a coke which, whilst a low temperature coke, capable of being burned in the open hearth, was also of sufficient strength to be used in metallurgical processes. Its resistance to crushing was equal to that of quite hard metallurgical coke. The process to which he referred was known as the Plassmann process. The coal was ground fine and was coked in trays in a sort of crevice a few inches in depth, so that on expanding with the application of heat it met with resistance from both sides, and a coke was produced in hard compact slabs. There was also the advantage that a coal which had not high caking qualities was better suited for the process. One of the troubles of low temperature carbonisation was that if a coal had considerable caking quality it was apt to stick, and did not lend itself advantageously to the process unless mixed with coal of a lower caking index.

He was pleased to notice the lecturer's reference to the setting up of a Coal Grading Board in India four years ago, which issued certificates of quality. The lecturer explained that that had gone far to rehabilitate Indian coal in the Eastern markets. Personally, he hoped that British coal-owners would take note of that fact. The Samuel Commission and others had recommended that coal should be graded and sold on an analysis and quality basis. That would do a great deal for the improvement of the coal trade in this country, and it was interesting to find that India had given a lead in that respect.

Mr. David S. Erulkar congratulated the lecturer on a very informative and lucid paper, which made it possible, even for a layman like himself, to follow with interest his paper without having to wade through formidable technical phrases. He was not, however, competent to offer any criticism on the technical aspects of the paper and would, therefore, confine himself to certain other questions arising out of the subject dealt with.

The lecturer said that India was not sufficiently advanced industrially to make use of more than a small portion of her mineral resources. It was of interest to consider what the difficulties were which stood in the way of the utilisation of the mineral resources of India in the country itself, and what should be the policy of the Government in regard to the export of the mineral resources of the country at that stage of the industrial development of the country.

The first of these questions was a problem by itself and could not be dealt with in discussion on the present occasion, but there was one aspect of it on which he would like to touch, namely, the absence of adequate facilities for transport. For the carriage of minerals cheap transport was essential, and it was necessary not only for the minerals themselves but also for fuel such as coal which was used in the various processes of manufacture. Unless the country provided cheaper transport for the carriage of minerals and fuel it was not possible for industries to be established Transport in India was mostly by rail, and the railways, owing to their intrinsic limitations, were not able to give the required assistance. On the long coast-line of India there were only four or five ports which provided the necessary facilities for loading and unloading; the rest of the ninety odd ports, being open roadsteads, were useless for the purpose of the establishment of industries. India was a country of long distances, and it was not possible for the railways alone, as he had said, to help in the establishment of industries. Coal at the pit's mouth, in Bengal and Bihar, was Rs.6 a ton, but by the time it had travelled to Bombay by rail the transport charges alone came to between Rs.13 8 and Rs.15, an addition of 225 to 250 per cent. As another illustration, there were salt mines in India, but the railways had not been able to help effectively in the distribution of salt, and India had to import from abroad large quantities of salt year after year. What was needed was adequate transport facilities cheap enough to help industries to establish themselves.

With regard to the policy which should guide the export of minerals from India, the minerals of India constituted valuable but exhaustible wealth of the country. The Industrial Commission stated that India's mineral resources were large enough to maintain the key industries. The External Capital Committee of 1925 recommended as a general principle that mining and such other concessions should be granted to external concerns only where it was clearly in the national interest that they should be developed, and where internal capital was not forthcoming on reasonable terms, and then only subject to such safeguards as might be suitable for each case. As a result of that recommendation he did not know of any effective safeguards that had been provided in the manner suggested.

The lecturer referred to the opposition to the Mica Bill. That opposition arose because it was apprehended by Indian interests that the Bill would act seriously to their detriment. It originated with the Deputy Commissioner, who was the ex-officio President of the Kodarma Mining Association. Under the Bill he was proposed as the licensing officer, and that aroused apprehensions that the giving of wide powers to the police and Government officials would mean an interference with personal liberty and freedom of trade, and that Indian interests would be seriously jeopardised. What was wanted was a strong and sympathetic policy that such matters should be controlled and guided in the national interest.

Referring to another matter, he pointed out that it was recognised that labour conditions in Indian mines were anything but satisfactory. Some time ago there was an agitation in India against the employment of women underground, and it was agreed that that should be prohibited, but it appeared from the report of the Mining Inspector for 1928 that in that year there were about 78,000 women working in or about the mines regulated under the Indian Mines Act. Of these about 18,000 were employed on the surface and 28,000 engaged in open workings, leaving nearly 32,000 working underground. In 1928 draft regulations for the prohibition of the employment of women underground were published, but judging by the report they were being enforced extremely slowly, because it was pointed out that, with effect from July 1st, 1929, the employment of women underground in mines, other than the coal mines in Bengal, Bihar and Orissa and the Central Provinces, and the salt mines in the Punjab, had been prohibited, but it was significant that the exceptions referred to over 28,000 of the total number of 31,000 odd women, leaving only about 3,000 to come under the prohibition. Under the gradual prohibition proposed in the report the total prohibition of women working underground was not expected to be complete before 1939.

DR. MURRAY STUART, D.Sc., Ph.D., said the lecturer had referred to the possibility of some form of low temperature distillation proving of value to India. Just how valuable low temperature distillation could prove to be both to the coal industry of India and to certain other mineral industries did not appear to be even guessed at in that country. In this country a low temperature distillation plant with a throughput of about 100 tons a day was working in conjunction with a large electric power generating station. Treating the coal by that process, and burning semi-coke under the boilers instead of raw coal, and selling the derivatives obtained by the distillation of the volatile constituent made it possible to supply semi-coke to the boilers considerably cheaper on a thermal basis than an equivalent amount of raw coal would cost With coal at 12s a ton there was a saving of approximately 3s. a ton on the coal treated. The important point was that if that same coal cost only 6s. a ton, the value of the derivatives obtained by the distillation of the volatile constituent would almost exactly equal the cost of the raw coal plus the total cost of treatment, including amortization ; in other words, semi-coke could be produced at no cost, and under those conditions the electric power generating station could compete successfully with a hydro-electric scheme.

Six shillings a ton was an outside price in India, in and around the coalfields, and in many instances coal could be obtained at an even lower price. It was, therefore, possible to generate electricity in India more cheaply than it could be produced by a hydro-electric scheme, and the working of bauxite deposits for the production of aluminium, and the installation of electrolytic zinc plants for the treatment of zinc concentrates in India became an immediate possibility.

There was another important aspect of the question. The lecturer referred to the so-called soft coke which was made in the coalfields. It was made by piling a mixture of second and third grade coal into heaps in the open, covering those heaps with fine slack and dust and then setting fire to them. The volatile constituent was not recovered and the soft coke obtained was of poor quality.

Reverting to the low temperature distillation plant, to which he had referred, the saving to be effected might be looked at in another way. On the basis of coal at 12s. a ton, if the value of the coal were taken at 100, after treatment two products were obtained : (*a*) derivatives with a cash value of 87, and (*b*) semi-coke with a cash value on a thermal basis of 76. Taken together there was an increase of 63 per cent. in the cash value. On the basis of the coal costing 6s. a ton, again taking the value of that coal as 100, the figures became much more startling. The derivatives had a cash value of 175 and the semi-coke a cash value on a thermal basis of 76, so that taken together the increase in the cash value was 150 per cent.

In the manufacture of the soft coke by the primitive method to which he had already referred there was a loss of at least 25 per cent. in the cash value owing to the non-recovery of the volatile constituent, and it was therefore obvious that low temperature distillation could compete successfully in India even with the soft coke industry.

He did not agree with the lecturer as to the outlet for low temperature semi-coke. The natural outlet in India would not be to replace cow dung as a fuel but to replace charcoal, the price of which was comparatively high. At the same time a new market would be found for the second grade coals which at present were passing through a difficult period. Second grade coals were excellent for low temperature distillation purposes. The demand was there, the material was there, and the industry could supply suitable processes ; all that was necessary was for India to wake up to the fact. It had been done in Japan, and what had been done in Japan could be done in India.

In Burma there were extensive deposits of tertiary coal which was not being used. Attempts had been made to use it in the same way that the denser and slower-burning coal of Indian and European commerce was used, and those attempts had been unsuccessful. In the Dutch East Indies there were large quantities of the same class of coal, and similar attempts had been made to use it with similar lack of success, but matters had not been left there ; the whole subject had been investigated with the result that a method had been evolved of burning those coals, so that not only were they used to-day on the ships of the Royal Dutch Packet Navigation Company, but many engineers actually preferred those tertiary coals to the older Indian and European coals. What had been done in the Dutch East Indies could obviously be done in Burma, so that Burma had a coal industry waiting on its doorstep for somebody to let it in.

MR. H. K. SCOTT said reference had been made to books of mica becoming smaller as the depth of mines increased, and he would like to know whether the lecturer thought that was due to some geological reason, and that with increasing depth they would become smaller still. He would also like to know the position in regard to manganese as compared with 30 years ago Were the manganese deposits becoming poorer and narrower, and what, if any, was the influence of the present water level upon the character of the depôsits ?

MR. R. à-ABABRELTON said Sir Richard Redmayne's remarks with regard to coal and to the Plassmann process were very interesting, and he would like to know whether the coal subjected to that process in Germany was ordinary coal or the brown coal which, he believed, was being extensively used in Germany at the present time. It would be interesting to know whether the brown coal of New Zealand could be treated in the same way.

SIR RICHARD REDMAYNE said there were two kinds of coal in Germany, brown coal and what they called stone coal. His remarks referred entirely to the latter, but curiously enough, he had spent a considerable time on behalf of the Government of New Zealand examining the low temperature carbonisation of brown coal which had been in operation there since 1870. As to whether the New Zealand coal could be treated in the same way as the German, that was another story. The brown coal of Germany was not altogether the best brown coal in the world, but the derivatives were protected considerably by a tariff wall.

Sir Albert E. Kitson, C.M.G., C.B.E., thanked the lecturer for a very interesting paper. He said he was not sure whether the average values given in the manganese diagram included or excluded the chemical ore.

With regard to the Kolar goldfield, it was interesting to note that though that field had now been producing for over a hundred years it was still, so to speak, in the heyday of its youth. Its deepest mine (nearly 6,700 feet) was the third deepest gold-mine in the world, the Rand first, with 7,640 ft. and Brazil second, and there was evidence that the quartz was as rich at that great depth as at the surface, which disproved the view commonly advanced that value decreased with increase in depth.

The question of refractories had been raised by the lecturer, and there was evidence that by work done in the last few years, particularly on the other side of the Atlantic, new uses had been found for some minerals which had formerly been regarded as of little value, such as sillimanite, andalusite, kyanite, zircon, etc., which were found to have much value as refractories. Garnet was sometimes regarded as only of value when perfectly unflawed and used as a minor gem, but it was now found useful as an abrasive. When India got a proper market for many of her supplies and over the high cost of transportation it would be possible for her to supply some of the demand from various other markets.

The question of transportation had been referred to, but he could not understand why a country which built and owned part or all of its own railways should call for high interest on the capital, and not recognise the indirect value gained through the railways being there. In his opinion, it was wrong to want railways to pay at once full interest on the capital cost. If that point of view were not stressed so much it would be possible to put a number of industries on their feet and give them assistance from the State generally by reducing transportation costs, and so secure the placement on the world's markets of numbers of minerals from British Possessions.

Coal was extremely important, and the question arose both in England, India and elsewhere as to why so much wealth was thrown away by a neglect of the by-products. It was necessary to discard many ideas which we in this country entertained when we were supreme in the commercial world. We were now competing with nations all over the world, which used modern methods and utilised every possible chance of doing things profitably, and we must become more alive to the fact that we were in many cases using a portion only of our coal and neglecting its by-products.

Mr. G. H. Tipper, in reply, said that the figures for the average price of ores, to which Sir Albert Kitson had referred, were taken from the various daily journals which gave the price per unit, and did not refer in particular to chemical ores, but to the ordinary metallurgical ores as sold in this country.

With regard to manganese and the effect of increase in depth, the most astonishing change that had taken place had been an increase in the phosphoric content of the manganese ore in India, and no adequate explanation of that had been given. According to Dr. Fermor, one of the greatest authorities, there was sufficient left in the earth to last for several centuries.

It would take him too long to explain his idea as to how the books of mica occurred.

He thought there was still every chance that books just as big as ever would be found.

Everyone would like to see minerals transported about the country for nothing, but unfortunately things could not be done in that way. Adequate and cheap transport was undoubtedly of interest not only to the men who mined the minerals, but to those who were interested in the problems which afflicted the miner after he had got the minerals to the surface.

He felt that adequate discussion of the other points raised would take too long but he hoped to have an opportunity of meeting some of the questions at other times.

He would like to thank Sir David Chadwick very heartily for taking the Chair.

On the motion of the Chairman a very hearty vote of thanks was accorded to the lecturer for his interesting paper.

The meeting then terminated.

SIR LAWRENCE WEAVER

At a Council Meeting of the Royal Society of Arts, a letter was read from the Hon. Stafford Cripps, a Fellow of the Society, as follows :—

3 Elm Court,
Temple, E.C.4
25th March, 1930

Dear Sir,

A meeting was convened some seven weeks ago under the Chairmanship of Lord Lee of Fareham, to consider a suitable memorial for the late Sir Lawrence Weaver.

All the Societies in which Sir Lawrence was interested were represented, including the Royal Society of Arts. A number of suggestions were put forward, and a sub-committee was appointed under my Chairmanship to consider the various suggestions and to make recommendations thereon. Amongst those suggestions was one that the memorial should be identified in some way with the activities of the Royal Society of Arts more especially in that aspect of its work which deals with the encouragement of the use of the arts in manufactures.

My Committee have carefully considered this suggestion, and feel that the work of the late Sir Lawrence Weaver could not be better commemorated than by the dedication to his memory of some hall or room where exhibitions of a suitable nature could be held throughout the year.

I have been instructed accordingly to address this letter to you and to enquire whether your Council could suggest any suitable way in which my Committee could co-operate with your Society to achieve this end.

My Committee would be hopeful of raising several thousand pounds for a scheme which promised to be of real utility in forwarding the ideas of Sir Lawrence Weaver as to the proper relationship of Art to Industry.

In case your Council might have any suggestion as to co-operation with my Committee in such a scheme, my Committee have appointed a sub-committee of 3 persons to meet your Council or a sub-committee thereof to discuss the matter.

My Committee regard the matter as one of some urgency as they are anxious not to allow too long a period to elapse before putting out their appeal for funds.

I very much hope that your Council may see its way to co-operate with my

Committee in this matter, as my Committee feel very strongly that it is unwise to dissipate the energy and resources available in this cause by the setting up of any new body to carry out what they realise to be one of the important objects of your Society.

I am, Sir,
Your obedient Servant,
(*Signed*) R. STAFFORD CRIPPS.

The Secretary,
Royal Society of Arts.

A Sub-Committee was at once appointed to deal with the matter and make a definite proposal to the Memorial Committee. Mr. Clough Williams-Ellis, whose splendid activities in the cause of Rural England are so well known, succeeded Sir Lawrence Weaver as President of the Design and Industries Association. Writing on the subject of an appopriate Memorial to Sir Lawrence Weaver, he says :—" If any one Society could be representative of his interests, it would be the Royal Society of Arts, Manufactures and Science." He adds : " But then there is Agriculture and Advertising, Land Development, and a whole lot of Applied Arts," all of which, by the way, are covered by the activities of the Royal Society of Arts In case the Fellows of the Royal Society of Arts do not see the admirable Journal of the Design and Industries, and are not familiar with the many-sided work of Sir Lawrence Weaver, we cannot do better than quote in full the personal tribute of his successor in the Chair of a Society to which he devoted so much of his energies.

SIR LAWRENCE WEAVER

1876-1929

There were many things that he did, and all of them he did well, valiantly and blithely. I think of him as this, and I think of him as that, in this situation and the other, loaded with work and responsibility, often with anxieties, yet never afraid, never defeated, always debonair.

To me he seems the pattern of the good adventurer, the man of parts and wiles, who delighted in his power over other men yet never used it basely.

His own generous response to whatever was fine in a cause or in a character awakened in others that devotion which unfailingly surrounded him with a willing band of workers for whatever new adventure he might embark on.

As prophet and reformer Lawrence Weaver could see many things wrong with the world—with art, with agriculture, and with industry. As a man of action he was quick to initiate practical steps to secure improvement, and untiring in his devotion to the causes he espoused.

He was a psychologist rather than a philosopher, though what he did perceive he saw with so clear and single an eye that his direction of those who accepted him as their guide and leader (and they were many), was both inspiring and effective because his aim was sure.

Lawrence Weaver was many things and many people, and, though he might have been less or more or very different under other circumstances, he would assuredly have made his mark and impressed his personality upon whatever career he might have chosen at all answerable to his talents. In diplomacy or politics, in the Church or at the Bar, as a journalist, an industrialist, or an administrator—in all these walks of life he would, I feel, have not merely succeeded, but have served his generation and his country well.

Asked of a sudden to point to an example of "Success," I think the busy, buoyant figure of Lawrence Weaver would have occurred to many of us. He would not, I think, have objected—he had achieved so much that he had set out to do, and more beside; he had prospered in the world, yet not by yielding to it, but by his gallant challenging of "the thing that is."

For a world in which such as he can flourish and be happy, there is hope. Had Lawrence Weaver's epitaph been that of failure from the worldly and personal point of view, of one disillusioned and rejected, it might assuredly have indicated a detached saintliness that he himself would have laughed to have attributed to him. Otherwise it would have meant that the world was unfit for a practical idealist who had the courage to show up its shortcomings with wit and eloquence, and who, further, had the ability and energy to do or get done many of the things it stood in need of, yet knew it not until he showed the way.

All honour to our martyrs, but honour also to our happy warriors who, assuming that the world was essentially a decent place, have helped to make it so.

The causes of Architecture, of the Applied Arts, and of Rural Amenities are for ever in his debt; for each and all of them he wrote and spoke and worked untiringly, and to all of them his going is not only a bereavement, but a danger.

To us, his friends, he leaves a legacy of work that we will surely accept with gladness, for in doing so we shall best please and keep alive the keen spirit of a dear and valiant man.

CLOUGH WILLIAMS-ELLIS

CORRESPONDENCE

THE IMPORTANCE OF GERMAN AS A COMMERCIAL LANGUAGE

The *Europa's* successful effort to beat her country's own Atlantic record, reminds us once more how surely Germany is establishing her status in Europe and the world.

The reminder is one to which a nation of shopkeepers may well pay heed to-day, when many of them talk in a fashion suggesting that the time has come to put the shutters up. In the year before the war we sold Germany £40,677,379 worth of goods. She was a good customer of ours then and the present possibilities of the German market may be measured by the fact that our exports to it last year were only two and a half million pounds short of the pre-war figure.

In these circumstances it is gratifying to learn that the German language again seems likely to beat Spanish as the second favourite (French, of course, leading) amongst us. Certain firms are now arranging for their representatives to learn German, and the German attitude is indicated by the collaboration of six eminent German professors with the Linguaphone Institute in producing a gramophone language course for students while German salesmen are learning English by like means.

Trade with the Dominions overseas is a wholly admirable ideal; but we must not allow it to blind us to this vast market on our doorstep.

J. E. MILLS,
M.P. (Lab.), Dartford

NOTES ON BOOKS

STAFFORDSHIRE POTTERY FIGURES. By Herbert Read. London: Duckworth. *2gns.*

On page 22 Mr. Read indicates very simply the frame of mind in which Staffordshire pottery figures should be approached. They are peasant art. The materials of which they are made do not lend themselves to the refinements of porcelain. They were not in the first place meant to be more than " a cheerful ornament in a farm-house or a labourer's cottage." But sometimes, as Mr. Read puts it, the simple craftsman " blunders into beauty." He " strays unconsciously into a realm of purer forms."

So that there are two reasons for people wanting to collect these figures : to wit, their beauty and their quaintness. The word quaintness, though so often abominably misused, does mean something, and something not in itself objectionable. See, for instance, plates 7, 14, and 15 : figures on horseback. Surely these are both quaint and amusing ; quaint with an appeal that is neither forced nor exaggerated.

The period surveyed by Mr. Read lies between 1650 and 1850 : in these two centuries our fine arts as well as our popular arts flourished ; thereafter came the deluge, causing those floods which we are to-day struggling so desperately to roll back. Dwight was the inventor who made possible the production of the original salt-glaze figures ; Thomas Whieldon and John Astbury established the pottery industry in Staffordshire. Most interesting is the correspondence quoted by Mr. Read relating to John Voyez ; Josiah Wedgwood's letter to Thomas Bentley is indeed a " perfect footnote to the history of the Industrial Revolution."

MEETINGS OF OTHER SOCIETIES DURING THE ENSUING WEEK.

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THURSDAY, APRIL 24..Auctioneers and Estate Agents Institute, 29 Lincoln's Inn Fields, W.C. 7 p.m. Mr. S. P. Bird, " The Conversion of Properties into Flats and Maisonettes."

FRIDAY, APRIL 25..Electrical Engineers, Institution of, at Swansea. Messrs. S. W. Melsom, A. N. Arman and W. Bibby, " Surge Investigations on Overhead Line and Cable Systems."

Faraday Society, at Burlington House, W. 2.15 p.m. Annual General Meeting. 2.30 to 4 p.m., and 4.30 to 7 p.m. General Discussion on Optical Rotatory Power. Introductory Paper by Prof. T. M. Lowry (I) " The Physical Basis of Optical Rotatory Power." 1. Professor P. P. Ewald, " Introduction to Physical Theories of Natural Optical Activity." 2. Mr. G Temple, " Wave Mechanics of Optical Rotation and of Optically Active Molecules." 3. Professor R. de Mallemann, " On Molecular Theory and the Calculation of Natural Rotatory Power." 4. Dr. Werner Kuhn, "The Physical Significance of Optical Rotatory Power " 5. Dr. K. Wolf, " The Principle of the Free Rotation of Optically Active Molecules." 6. Dr. H. G. Rule, " The Influence of Polar Substituents on the Optical Rotatory Power of Organic Compounds." (II) " Apparatus and Methods." 1. Dr. R. Descamps, " Methods for the Measurement of Natural Rotatory Power in the Ultra-Violet Region of the Spectrum." 2. Professor T. M. Lowry and Dr. G. Owen, " Note on the Calculation of Dispersion Equations."

Mechanical Engineers, Institution of, Storey's Gate, S.W. 6 p.m. Mr. Francis Carnegie, " The Mechanical Production and Distribution of Steam in Large Factories."

University of London, at King's College, Strand, W C. 5.30 p.m. Mr. H Jenkinson, " English Seals, Medieval and Modern."

SATURDAY, APRIL 26..Faraday Society, at Burlington House, W. 10 a.m. to 1.15 p.m., and 2.30 to 4 p.m. General Discussion on Optical Rotatory Power. (III) " Rotatory Power of Solutions." 1 Professor A. Cotton, " The Existence of Racemic Compounds in Solution and the Application of Circular Dichroism to the Synthesis of Active Compounds." 2. Professor E. Darmois, " Salt Effect and Rotatory Power." 3 Professor G. Bruhat, " The Absorption and Rotatory Dispersion of Solutions of Tartaric Acid." 4. Dr. P. C Austin, " The Rotatory Dispersion of Tartaric Acid and its Derivatives." 5 Dr. R. Lucas, " The Origin of the Variations in the Rotatory Power of a Compound." 6. Professor T. S. Patterson, " The General Behaviour of Optically Active Compounds from a Single Point of View." 7. Mr. Gwyn Owen, " The Effect of Concentration on the Values of the Dispersion and Rotation Constants for Solutions of Camphor in Methyl Alcohol." (IV) " The Chemical Aspects of Optical Rotatory Power." 1. Dr. W. H. Mills, " Molecular Dissymetry." 2. Professor R. Betti, " Relationship between Rotatory Power and Chemical Constitution." 3. Dr. J. Kenyon, " Relation between the Rotatory Powers of the Members of Homologous Series." 4. Professor J. Read, " Optical Superposition." 5. Dr. J. Kenyon and Dr. H. Phillips, " Some Recent Developments in the Study of the Walden Inversion."

JOURNAL OF THE ROYAL SOCIETY OF ARTS

No. 4040 *FRIDAY, APRIL 25th, 1930* VOL. LXXVIII

All Communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C.2.

NEWS OF THE WEEK

> *" There is no age of our life which doth not carry arguments with it to humble us ; and therefore it would be well for the business of the world if young men would study longer before they went into it, and old men not so long before they went out of it."*
>
> *George Savile, Marquis of Halifax.*

> *" It is the greatest of national work to perfect the village unit ; and we shall only do it by aid of a livelier imagination that grasps the new opportunities in time to fend off the new dangers. To this end we need a Church with more various activities ; we need schools with more instruction ; we need farmers with a more corporate sense ; we need labourers who are free. If they interfere with progress to the ideal of a co-operative village, with a soul of its own, dogmas, conventions, and labels must be jettisoned with other rubbish, however precious and deeply rooted they may seem."*
>
> *Sir W. Beach Thomas.*

The Face of England. - Sir Arnold Wilson, who is a member of the Council of this Society, addressed a long letter to the Editor of *The Times*, urging that a Royal Commission should be set up, and that public opinion is favourably disposed to legislative steps being taken to protect public amenities. There is no time before going to press to deal with this important subject adequately. We notice that Sir Arnold Wilson is bending his energies to co-ordinate the various Chemical Societies into one strong body representative of this branch of science. A Sub-Committee of the Council of this Society has been appointed to consider why it would not be possible to co-ordinate the fifty or more societies which have for their objective some form of preservation. We cannot do better than quote from a recent issue of the Journal, to which we are sure Sir Arnold Wilson must surely subscribe :—

> The recent activities of the Society in connection with the preservation of Urban and Rural England suggest that the importance of this side of the work has become apparent ; as *Country Life* well says :—" Modern conditions have made of preservation a new and vitally important undertaking, in part an art, in part a method of government. In a sense it is synonymous with civilisation itself, the old significance of which has been usurped by material progress. Industry, speed, wealth and invention, are not, as the age is in danger of believing, ends in themselves, but means to the appreciation of intellectual and spiritual values of which nature is the source. But the means will destroy the end unless all cultured persons and bodies unite to guard civilisation from the wrong sort of ' progress.' A Royal Society of England can co-ordinate all the forces necessary to unite the nation into something that will have the integrity of the period of 1861 but with a more informed scientific attitude, and a nobler vision of what art really means to the individual citizen."

The ineffectiveness of legislation is surely illustrated by the fact that even when local authorities have the power to deal with the appalling effects of misdirected advertising, no steps seem to be taken to avail themselves of their powers. There seems to be no solution to the problem except from a higher standard of education everywhere in the personnel of the authorities in our towns and villages. The pressure of educated public opinion properly organised in each locality has been, and will always be, successful. As a people we do not take kindly to laws and regulations restricting personal liberty. We hope to deal next week with a particular case of the efforts of a private individual to indicate how with care and thought unsightly building is unnecessary, and how this has been resisted in the face of every encouragement by the local authorities.

Norman Shaw and Farnham.—A Fellow of this Society and a well-known architect draws our attention to the proposal by Lloyd's Bank to remove the very elaborately timbered building so familiar in this village street. He accompanies his letter with letters from important local residents and eminent architects, all of whom express greatest regret that this typical example of Norman Shaw's work should be removed. We should very much like to have heard the Bank's side of the question. The building appears to be of considerable size, and is certainly very conspicuous as compared with the simpler and more characteristic buildings in this beautiful street. Information with regard to the reasons for destroying this building is the more important in view of the fact that recently the principal banks have really been building in a quite satisfying manner and with an effort to consider the characteristics of the streets in which they build. We should like to return to this subject when we have more information as to Lloyd's Bank's reasons for destroying a building on which so much labour and good workmanship has been spent. Mr. Harold Falkner's fine drawing expresses the characteristic Norman Shaw details admirably, and reduces the charming little house next door into insignificance. We should like to show this building in a photograph, when it would be seen how completely it was designed without any relation to the street. If the Bank proposes to put up a new building here the responsibility of the architect in pulling down a building designed by Norman Shaw would be very considerable. The subject opens up a most interesting question as to how far a building, however good as an individual design, can be regarded as a work of art if it does not fit in with the control of the street and its surroundings. The spirit of place surely has a very great deal to do with the charm of the older and less ostentatiously designed buildings. One recalls Norman Shaw's work at the end of St. James' Street, where he designed two buildings in an entirely different manner and with no consciousness of the atmosphere of the street. We however, hope that Lloyd's Bank will favour this Society with their reasons for what, in any case, seems a very wasteful action.

It is due to our correspondent to quote the last portion of his letter :

> " The callous way in which landmarks are swept away to allow of ' modern improvements ' is appalling and I hope the Society will add their protest and use every effort to influence the Bank to reconsider its decision, for in this case the building is suitable for its purpose, large enough, well built, in excellent state of repair and a joy to the residents and to all that pass this beautiful old street "

Glastonbury.—We have received the following letter from Mr. Alfred C. Bossom, a Fellow of the Royal Institute of British Architects and well known in Architectural circles, and who is on the Council of this Society :—

> By the way, did you see the letter in *The Times* on Friday about Glastonbury ? This is a very terrible situation and it certainly needs a very strong protest as they are going to put a car park right against one of the most sacred spots in the country, and the destruction that has already taken place is an example of vandalism which is beyond description.
>
> I am, as you know, entirely in favour of all forms of progress, but having seen the magnificent work that you and your Society have accomplished, I venture to take a few minutes of your very much over-occupied time to ask if there is no way of getting a real protest made in this connection. I think it is more due to ignorance than anything else, and if you could bring your guns to bear upon that, I really think they would thank you.
>
> I understand they are actually to-day taking the stones of Glastonbury Abbey wall and crushing them to form the foundation of the motor park. I don't know if this is within your province, but I should think Mr. Powys, to whom I am also writing, might also bring a protest. I am writing a note to Mr. Dawber of the C.P.R.E., so that if a certain amount of concentration can be brought to bear, it may have some help.

We understand that the work in connection with this motor park is already in hand. It is a pity that there are no local correspondents of the Society in the town to report on what appears to be a very bad piece of business for the amenities of this lovely and historic place, no one to suggest some alternative and equally satisfactory way of getting the necessary convenience for visitors. Surely the plans for this motor park must have been submitted to the Town Council, and if the proposals are detrimental to the beauty of the town's greatest possession there should be enough educated people in Glastonbury to prevent any unsightliness to its beauty.

Three years ago there was a similar proposal near the Abbotts' Kitchen, which was stopped by public protest. Will a Fellow of the Society in the neighbourhood favour us with particulars of what is going on, and a photograph of the work in progress ?

Village Inns.—This Society's insistence that something should be done before the fine weather to make the English Inn more hospitable seems to have excited considerable public interest. Amongst a few references to this, we quote the following letter addressed to the Editor of *The Times* in the issue of 22nd April:—

> Sir,—Granted that " Innkeeper " may be justified in complaining that some of his guests are unreasonable and expect too much of a village inn, the fact undoubtedly remains that in far too many cases the perfectly reasonable and unexacting traveller who does understand and appreciate the limitations of the countryside and the innkeeper's difficulties meets with a reception the reverse of accommodating. He is apt to be refused the plainest of plain meals, let alone a room for the night.
>
> The real root of the trouble is, I fear, to be found in the unfortunate fact that the British innkeeper is too often primarily a publican and almost solely concerned to push the sale of his liquors. The spread in recent years of the very questionable " tied house " system has probably done much to aggravate this phase of the problem.
>
> But there can also, I submit, be no doubt that innkeepers in this country have, as a class, been painfully slow to take proper advantage of the greatly enhanced prospects of new business opened up to them by the rapid development of motoring through the length and breadth of the land. It is surely somewhat irrelevant to talk of the parlous state of agriculture as a contributory cause of the innkeeper's difficulties, when the fact remains that the advent of the motor-car has, for the first time, brought even the remotest parts of the English countryside within reach of the most modest purse.
>
> I am convinced that, even allowing for certain difficulties inherent in all branches of the caterer's calling, a golden opportunity is being, perhaps irretrievably, lost, owing to lack of enterprise and ambition and the absence of any real desire to give the travelling public what it wants, rather than what " mine host " chooses to think is good enough for it ! How otherwise are we to account for the fact that even fresh, homely farmhouse fare is so often difficult to obtain at country inns ? One asks for cheese and may be given Canadian ; for meat, and one receives the produce of the Argentine or New Zealand ; for stewed fruit—with orchards perhaps all around one—and there appears a mess of pineapple cubes, with sections of other foreign-grown fruits, extracted from a tin ! Even the very milk may hail from a far country, and the peas and beans have sprouted " 'neath an alien sun." Is this really the best that a patriotic British innkeeper can do to meet the reasonable requirements of his guests and at the same time give a helping hand to the hard-hit British farmer ?
>
> Yours obediently,
>
> ERNEST LESSER.
>
> 13 Holland Villas Road, W.14, April 20.

We also quote an extract from one of the delightful articles which occasionally appear on the back page of *The Times* :—

A slight change of heart and the many delightful inns of rural England would become as enchanting as they look. It is true that the innkeeper has his difficulties. The cherry-cheeked damsels who should be wearing mob caps and using a warming pan have fled to the nearest factory, and help is often hard to get. He may be the servant of a company, an agent harshly tasked and pledged to rigid economy. Certainly he has rheumatism and is always too cold. But laziness—may one hazard?—is partly to blame for the present incompetence in the country. Let pig, tinned foods, and watercress, productive of slothful minds, be prohibited in rural areas for ten years, and severely restrict the consumption of tea. Let unaired rooms and damp beds be taxed ; let fire worship be preached in a country that never has too much sun, extravagant open fires of coal and wood splendidly roaring up the chimney to make the spirit of man more genial and generous.

Meantime a new guide-book to the English countryside is called for, a book that will omit Roman remains and state where rooms and food are to be found. Maps do not indicate the inns that will not open their doors ; guide-books are full of foolishness about Nature. But Nature, which does so much for the Trade, should be more loyally backed by the innkeepers. Travellers will always say so

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Hadrian's Wall.—We were delighted to read the following letter from presumably representatives of Shrewsbury School. We trust the town will take notice of this protest from such a source.

HADRIAN'S WALL.

To the Editor of *The Times*.

Sir,—May we record with what horror we read in *The Times* of the proposed scheme for quarrying the Great Whin Sill in the neighbourhood of Housesteads ? We have just finished walking along the Wall, and appreciate with especial liveliness the enormity of the suggested operation. Any traveller along the Wall must be conscious of the damage already inflicted by existing quarries, and the present proposal could not fail to destroy what is at once the best-preserved and most characteristic stretch of the Roman fortification. Is it not possible to leave this imperial monument for the curlews to haunt and for time alone to destroy ?

We are, Sir, your obedient servants,

J. H. Tombling,
K. B. Banks,
J. M. Street,
D. S. Colman.

The Schools, Shrewsbury.

Is there no answer to the letter which follows ?

To the Editor of *The Times*.

Sir,—When one reads the outbursts in many papers against what is called the scandalous outrage meditated near Hadrian's Wall it seems almost time to call a halt and think.

Here is a proposition that is reported as likely to give work to many men over a period of years, yielding first-class and valuable material, whole-heartedly denounced because it may detract from the appropriateness of the approach to a historic monument. After all, England is not yet a " museum piece," but the home of 40-odd million of people, who surely should take precedence of any antiquity, and the idea that much useful productive work and employment should be turned down with a howl of disapproval because those of us who have time to visit this remote district may lose some æsthetic pleasure argues an insincerity in our view of the tragic social problems of the present day.

Besides which, it should not be beyond the wit of man to arrange quarrying the stone without serious detriment to Hadrian's Wall. Orderly and thriving industry, even with its attendant buildings, is a more cheering proposition than the desolation of depopulation, and anything that is likely to reduce it should have at least a fair hearing.

Yours truly,
WILL CADBY.

Foot's Hill, Shaftesbury, Dorset.

We are familiar with Shrewsbury, and its recent building developments and we do not observe that stone is giving employment to many. There would be more argument in Mr. Cadby's rejoinder, if the use of the stone of the quarry added its beauty to the locality. We cannot believe that the educated mind in Shrewsbury will allow these great possessions to be destroyed. They will find other sources available for quarrying, and for the employment of the comparatively few people needed, unfortunately, for such work under such circumstances.

Blewbury, on the Berkshire Downs.—We are familiar with this beautiful little village near Streatley and its delightful contrast with the gaudy red-roofed villas and boathouses not far away. The preservation of the walls of Blewbury, which are said at one time to have encircled the village and which in places are eight or nine feet high, is surely well worth the consideration of everyone in the near locality. The renewal of these crumbling thick mud-built walls should not be a very considerable business, and a fresh coating of thatch would preserve them for a considerable length of time. There is an excellent photograph of the village and walls in *The Daily Telegraph* of April 7th.

Lighting of Picture Galleries.—The following letter calls attention to a very serious defect in most of our English Picture Galleries. We understand that Lord Lee of Fareham has experimented very successfully in the small galleries which house his fine collection of Old Masters at the White Lodge. Here, both by daylight and artificial light, he has so skilfully manipulated the lighting that there is not the slightest reflection within any of the picture frames.

THE RESEARCH COMMITTEE

TO THE EDITOR OF *The Daily Telegraph*

Sir—As an ordinary visitor to the National Gallery and other galleries, often wondering at their bad lighting, which Mr. Francis Howard's article of April 10 arraigns, I was moved to consult the Illumination Research Committee's technical paper No. 6 referred to, in quest of a little more light on the subject.

This in a negative way it affords, by disclosing that none of its eleven members are gallery directors, artists, or authorities on arranging and exhibiting pictures, and there is no indication that the advice or assurance of any such has been sought or employed. It is as if a sound committee for opera houses and concert halls were to exclude all musical co-operation.

Paper No. 6 also reveals that preoccupation with elimination of picture glass reflections sacrifices the actual visibility of the picture on occasion, which is indeed sacrificing the substance for the shadow

Surely some element can be added to this committee which will ensure better direction and result in its activities.—Yours, &c.,

K. HORFIN.

Loxwood, Sussex, April 14.

Books.—" Assorted Articles," by D. H. Lawrence, has just been published at a time when critical studies and obituary notices of this writer have brought him into almost greater prominence than in his lifetime. He is, perhaps, the most discussed writer of the moment. What a very great force he would have been if he had been a little more balanced, for D. H. Lawrence had courage to the point of brutality, and if this courage could only have been used to better advantage, he might have been a great prophet and spokesman for the 20th century. In this book of short essays he shows himself much more a real person with much less crudeness and more humour than anything we have read. Short essays like these are often the happiest medium for a man with a mission; in such momentary impressions we get a charm and irresponsibility which shows real character more than a purposeful full length novel. The obsession with sex which narrowed and spoiled so much of Lawrence's work is here brought into focus with the ordinary things of life and the result is a very charming and vital book with a broad horizon and a delightful spice of humour. " Give her a Pattern," and " Laura Phillipine " are two of the best, and there are some interesting autobiographical sketches.

" Theatre Street," by Tamara Karsavina, appeared a week or so ago and after the enthusiastic reception it received we feel it is almost unnecessary to say any more in its praise than has already been said. However, it is such an unusual autobiography and such an enthralling subject that we should be very sorry if anyone missed the opportunity of reading it, and therefore, we will add a further word heartily recommending it as a most dramatic and beautifully written history of a great institution, alas now dead, for Diaghileff the great personality of the later years of the Russian ballet, died just before this book appeared and there seems to be no one to take on his work. This book does not follow the usual method of theatrical reminiscences, and indulge in a collection of personal anecdotes; in fact, it is singularly free from any of the usual faults. It is unique in that it is a real history of the Imperial ballet and yet with a living and fascinating personality behind. The present writer once had the experience of watching Cecchetti, the great master of the Russian ballet, take his class in London, and one felt the intense, almost fanatical, devotion to the art; there were no half measures, and this is the spirit which breathes through this book. The art of the Russian ballet was a real life sacrifice to dancing without a backward glance. It makes one wonder whether with all their talk about " expression " any modern city can again produce a great community with such a single minded purpose as the Imperial ballet nursed in Theatre Street.

Drama.—The Everyman Theatre Appeal.—How many people know what a splendid tradition is being carried on by the Everyman Theatre at Hampstead? Against the most overwhelming odds it has continued its policy of producing good plays for short runs and has more claim than any other to be called our National Theatre, except for the fact that it is a little off the beaten track. But although it is off the beaten track for the masses it is right in the heart of a district which ought to give it every support—Hampstead and Golders Green, the home of the Highbrow! But alas, Hampstead has failed badly, and most of the support given to the Everyman is from other districts. However, perseverance is being rewarded and some of the splendid productions, especially " Charles and Mary," which was lately transferred to the West End, have earned for the little theatre well deserved praise and publicity. This week and next Sybil Thorndike is appearing in " Ghosts," and they have many interesting productions for the future. As it is being run on lines similar to the Theatre Guild of New York, any support will be gladly received and information willingly given.

Pictures.—It is rather a relief to turn from some of the modernistic experiments in paint to the quieter charm of the Royal Water Colour Society's exhibition at the Royal Institute's Galleries in Piccadilly. There is some excellent work and the whole exhibition gives one a feeling of clear cool colour, and again one cannot help contrasting the atmosphere with some of the recent exhibitions of strident oil paintings, striving to be " new " and " interesting " at all costs. It is ridiculous to compare the merits of different mediums, but it is much more difficult to play tricks in water colour and that is, perhaps, why there is a simplicity and directness in this exhibition which is lacking in so many others. On the other hand there is a great deal that is very laboured especially large water colour portraits which are seldom entirely successful. There are some delightful landscapes by Graham Petrie, who has a most extraordinary gift for portraying sunshine and light. Loxton Knight has two charming sketches in wash. Lewis Baumer's little figures are exquisitely suggested with just touches of colour here and there. These are artists who realise the limitations of their medium as well as its possibilities and this is the very essence of water colour painting. A great majority of the other exhibitors have merely tried to get away from the water colour element and in some of the portraits they have lost it altogether. Some of the flower groups are charming, notably one of roses in the first room.

Industrial.—GLASS AT HEAL'S.—Some of the most delightful and original glass work we have ever seen was exhibited at Heal's Mansard Gallery last week. Vases, figures, flowers and fishes in exquisite colouring and design were the work of Cappellini of Medrano, and apparently the firm has only been in existence a little over a year. Some of the most interesting exhibits were blown with a sort of gold sheen mixed into the colour of the glass, and some very decorative fishes were treated this way with great success. Large bowls like delicately coloured bubbles and many lovely shapes in vases and ornaments make up the rest of the exhibition which really is a most disturbing one for lovers of glass! It seems a pity it was not more widely known and we certainly hope to hear more of this enterprising Italian artist before long.

We spoke the other day about the interesting new furniture and decorative ideas at Heal's, and we should like to say a word about a most interesting catalogue issued by the same firm which has just come to hand. It is called " A Matter of Taste " and it shows what can be done with beautiful printing and photography in modern advertising. We should like to congratulate Messrs. Heal upon this as a splendid example of real art applied to industry in the field of advertising.

NOTICES

COUNCIL

A meeting of the Council was held on April 14th. Present :--Mr. Llewelyn B Atkinson, M.I.E.E., in the Chair ; Sir Charles H. Armstrong ; Lord Askwith, K.C.B., K.C., D.C.L. ; Sir D. T. Chadwick, C.S.I., C.I.E. ; Sir Atul C. Chatterjee, K.C.I.E. ; Captain Sir Arthur Clarke, K.B.E. ; Rear-Admiral James de Courcy Hamilton, M.V.O. ; Mr. P. Morley Horder, F.S.A. ; Sir Herbert Jackson, K.B.E., F.R.S. ; Major Sir Humphrey Leggett, D.S.O., R.E. ; Sir Philip Magnus, Bt. ; Sir Reginald A. Mant, K.C.I.E., C.S.I. ; Col. Sir Henry McMahon, G.C.M.G., G.C.V.O. ; Mr. J. A. Milne, C.B.E. ; Sir George Sutton, Bt., and Mr. Carmichael Thomas, with Mr. G. K. Menzies (Secretary), and Mr. W. Perry (Assistant Secretary).

The following candidates were duly elected Fellows of the Society :—

Abbott, A., West Wycombe, Bucks.
Adams, Arthur H., B.A., New York City, U.S.A.
Alberga, George Frederick, B.Sc., Jamaica, B.W. Indies.
Baird, Miss Mabel, London.
Blackstock, Ira Burton, M.A., Springfield, Illinois, U.S.A.
Callard, Tom Vulliamy, Chesham Bois, Bucks.
Candlish, Boyd, Sandwich, Ontario, Canada.
Chambers, Charles Edward Stuart, Edinburgh.
Christie, Ernest, Ockley, Surrey.
Clark, Kenneth, London.

Colt, Samuel Porter, Wealdstone, Middlesex.
Cooke, William, London.
Dashwood, Sir John Lindsay, Bt., West Wycombe, Bucks.
Dashwood, Lady, West Wycombe, Bucks.
de Zilwa, Gilbert, The Hague, Holland.
Dulverton, Right Hon. Lord, Moreton-in-Marsh, Glos.
Everard, Frederick William, Wembley, Middx.
Galloway, Cecil Hadfield, London.
Giraud, Edmund Haydn, Bournabat, Turkey.
Glavin, Thomas, Queenstown, Co. Cork.
Goodale, Ernest William, M.C., London.
Hope, H. Donald, Smethwick, Birmingham.
Horth, Arthur C., London.
Jefferson, Mrs., London.
Johnston, William, M.I.E.E., Uxbridge, Middx.
Jones, W. Prestige, Chislehurst, Kent.
Kaempffert, Waldemar, Chicago, Illinois, U.S.A.
Laird, Donald Anderson, Ph.D., Sc.D., Hamilton, New York, U.S.A
Law, George Cheyne, A.M.I.E.E., London.
Lawson-Johnston, Hon. Ian St. John, B.A., Pavenham Bury, Bedford
Lees, Sir William Clare, O.B.E., J.P., Hollingworth, Cheshire.
Leverhulme, Right Hon. Viscount, London.
Makepeace-Warne, Keith, Taunton, Somerset.
Morris, John Arthur, Shrewsbury.
Murray, Mrs. Frances Winifred, London.
Nafe, Professor John Paul, Ph.D., Worcester, Mass., U.S.A.
Nicholson, John Gibb, Witley, Surrey.
Oake, Cyril Joseph, Yetminster, Dorset.
Oldach, William Howard, Panama.
Osborne, F., London.
Park, Professor J. Theodore, Sc.M., Selinsgrove, Pa., U.S.A.
Redman, A. J., London.
Rendell, Lieut.-Colonel Alan Wood, V.D., M.Inst.C.E., Binfield, Berks.
Ridley, G. A., London.
Rose, William Kendall, Gerrard's Cross, Bucks.
Russell, Archibald G. B., M.V.O., London.
Salwey, Jasper Philip, A.R.I.B.A., London.
Samuel, Miss E. Webb, Bristol.
Scott, John, London.
Strafford, Right Hon. the Earl of, London.
Sykes, L. B., London.
Tavroges, J., B.Sc., Guildford, Surrey.
Tryon, John, Watford, Herts.
Tryon, Wyndham, London.
Walker, Edward Bowker, Bucharest, Rumania.
Ward, James H., Manchester.
Wibberley, Professor Thomas, London.

Further consideration was given to the award of the Albert Medal for 1930

The question of the hour of the Ordinary Meetings was considered, and it was decided to hold some at 6 p.m. and some at 8.30 p.m., in the forthcoming session in order to ascertain if either of these hours would be more convenient to Fellows of the Society than 8 p.m., the present hour.

A Sub-Committee was appointed to consider certain proposals for establishing a Memorial for Industrial Art in memory of the late Sir Lawrence Weaver.

Preparation of the balloting list for the new Council was begun.

The reports of the Judges on the work submitted for the Thomas Gray Memorial Prizes were approved. (See below).

The terms of the leases for two inns and a chair factory at West Wycombe were generally approved.

Papers and lectures for Session 1930-1 were considered.

A quantity of financial and formal business was transacted.

THOMAS GRAY MEMORIAL TRUST

PRIZES FOR THE IMPROVEMENT AND ENCOURAGEMENT OF NAVIGATION

Under the will of the late Thomas L. Gray the Royal Society of Arts has been appointed residuary legatee of his estate for the purpose of founding a memorial to his father, the late Thomas Gray, C.B., who was for many years Assistant Secretary to the Board of Trade (Marine Department).

The objects of the Trust are " The advancement of the Science of Navigation and the Scientific and educational interests of the British Mercantile Marine."

REPORT ON THE COMPETITIONS OF 1929.

In 1929 the Council offered the following Prizes : -

I.—PRIZE FOR AN IMPROVEMENT IN THE SCIENCE OR PRACTICE OF NAVIGATION.

A Prize of £150 to any person who may bring to their notice a valuable improvement in the Science or Practice of Navigation proposed or invented by himself in the years 1928 and 1929.

Twenty-five entries were submitted for this Prize. On the unanimous recommendation of the Judges, the Council have awarded the Prize of £150 to

A. T. DOODSON, D.Sc., Associate Director, Liverpool Observatory and Tidal Institute, for his work on The Analysis and Prediction of Tidal Currents

II.—PRIZE FOR AN ESSAY.

A Prize of £50 for an essay on the following subject :—

" You are overtaken by a revolving storm. Discuss the handling of a low-powered steamer from the time of the first indication of the approach of the storm until the storm has passed, supposing the ship to be in (*a*) the safe semicircle, (*b*) the dangerous semicircle, and (*c*) the direct path of the storm's centre."

Sixty-nine essays were submitted for this Prize. On the unanimous recommendation of the Judges, the Council have awarded the Prize of £50 to

J. S. COMMANDER,
Master, ss. *British Ensign*,
The British Tanker Co., Ltd.,

and they have commended the essay of

Lieut. J. S. STEVENS, R.N., Royal Naval Staff College, Greenwich.

SUBJECTS OF COMPETITION FOR 1930.

The Council now offer the following Prizes :—

I.—PRIZE FOR AN INVENTION.

A Prize of £100 to any person who may bring to their notice a valuable improvement in the Science or Practice of Navigation proposed or invented by himself in the years 1929 and 1930.

In the event of more than one such improvement being approved, the Council reserve the right of dividing the amount into two or more prizes at their discretion. Competitors must forward their proofs of claim on or before December 31st, 1930, to the Secretary, Royal Society of Arts, John Street, Adelphi, W.C.2.

II.—PRIZE FOR AN ESSAY.

A Prize of £100 for an essay on the following subject :—

" The Training of Apprentices and Cadets with a view to their becoming efficient Officers in the Merchant Service."

Competitors must send in their essays not later than December 31st, 1930, to the Secretary, Royal Society of Arts, at the above address.

The essays must be typed or clearly written. They must be sent in under a motto, accompanied by a sealed envelope enclosing the author's name, which must on no account be written on the essay. A breach of this regulation will result in disqualification.

The Judges will be appointed by the Council.

The Council reserve the right of withholding the Prize or of awarding a smaller Prize or Prizes, if in the opinion of the Judges no suitable invention or essay is submitted.

The Council also reserve an option on the copyright of the successful essay.

PROCEEDINGS OF THE SOCIETY

DOMINIONS AND COLONIES SECTION

MONDAY, APRIL 7TH, 1930

LIEUT.-GEN. SIR WILLIAM FURSE, K.C.B., D.S.O., Director, Imperial Institute, in the Chair

The following lecture was delivered:—

THE EMPIRE CANNING INDUSTRY

By SIR EDGAR R. JONES, K.B.E.,
Chairman, Empire Canning Council

There is one factor blazing out like an illuminated sign that enables the spectator to realise the astonishing progress of the Canning industry in the United States of America during recent years. Before the war the American production of tinplates was about the same as the British production, but to-day the American production is double the British production. In 1913 about 700,000 tons of tinplates were consumed in the United States. To-day that consumption is around 1,400,000 tons. 76 per cent. of the tinplates used in the United States is used for canning foodstuffs. It is estimated that the output of canned foodstuffs in America is now worth over £200,000,000 annually.

Canada, Australia, South Africa, and New Zealand have made substantial progress in the Canning industry, and the indications are that there will be a large expansion of canning in those Dominions in the future.

Four years ago an organised national effort was made to expand the canning of fruits in Great Britain, and remarkable progress has been made in that short time. Attention was, however, directed to the fact that the enormous expansion in America was not connected mainly with canned fruits but with canned soups and vegetables. The national efforts recently have therefore been directed mainly towards creating a large industry in Great Britain for canning soups, peas, and other vegetables. Within a few years the new production has reached substantial figures, and new factories are building and in contemplation which will lead to a large production of these canned foods. The English canners are now preparing to open up an export trade, especially to the Empire, in the typically English fruits and vegetables.

If the four Dominions and Great Britain are excluded from the figures of the British Empire it is found that the total consumption of tinplates in the canning of food-stuffs in India and the rest of the Empire is only about 20,000 tons per annum, against the American consumption of 1,400,000 tons. Throughout this statement the remarks and references to the Empire will be limited to the British Empire minus Great Britain and the four Dominions referred to. Amongst the reasons for taking this course are

1. That the four Dominions have already organised the production and marketing of canned goods.
2. That essential factors like the supplies of cans, technical information, etc. are already provided for in the four Dominions.

As has been stated, the part of the Empire that is the subject of consideration has, comparatively speaking, no substantial canning industry. That Empire, however, has a population of 380,000,000 consumers, and if we add the other native populations adjoining the various parts of that Empire a total of over 800,000,000 is arrived at. This vast body of consumers eat food-stuffs like the consumers in other parts of the world. Amongst them, as in other parts of the world, there are similar problems such as gluts, shortages, seasonal crops, and marketing difficulties. These consumers also require special food-stuffs different from European food-stuffs. Very little has been done as yet to utilize the economic efficiency of the Canning industry for the preservation and distribution of the special foods of this vast population, as has been done for the food-stuffs of the American and European populations. A few firms in China have commenced canning such special native foods for distribution to the millions of Chinese in the Pacific and elsewhere outside of China. The Japanese have copied America in this as in many other directions, and there is already a very large canning industry in Japan. During recent years the Japanese have erected a number of canneries in Formosa, and have actually started a fish cannery in British North Borneo. As the Japanese have already proved in a substantial way, and the Chinese are already demonstrating in a small way as a beginning, there is a need for the services of a canning industry for the special purposes of the 800,000,000 consumers referred to. There will be people who will meet that statement with a dogmatic declaration that conditions are different, and that this vast population is not interested in canned foods. There was the same foolish dogmatism when the campaign was started in Great Britain, but it is now confounded by the results. Already there are the facts quoted above as to operations by the Chinese and Japanese, but there are other even more significant facts. The Empire is already importing substantial quantities of canned foods, such as milk, butter products, fish, fruits and vegetables, mainly from America. In spite of the existence of caste and other social and economic factors, India is already a large importer of these foreign food-stuffs. In the booklets that are circulated some of the statistics of these importations are given. There is also quoted the report of an American investigator. That report indicates that America sees in this vast body of consumers the greatest market of the future. America is already canning varieties of fish not very suitable for her own population, and they are being sold in rapidly increasing quantities in West Africa, East Africa, the Straits, and in other parts of the Empire.

There is a clear, blunt challenge in these facts. Are we going to fold our arms and let the whole of the Empire and its enormous possibilities be exploited entirely from America and Japan ? The response to that challenge has been the formation in London of an Empire Canning Council. Representatives of the various parts of the Empire have agreed to co-operate in an effort to promote the expansion of a Canning industry throughout the Empire. The objects and aims of this Empire Canning Council are set forth in a booklet that is now ready for circulation to all who may be interested.

There are certain considerations that it is advisable to emphasise from the outset : —

1. That every part of the Empire should consider mainly the requirements of its own population and the possibility of canning for those requirements. This particularly refers to special native foods, milk, fish, and fats, or edible oils.

2. In conjunction with the question of local requirements for any particular class of food-stuff, the possibilities of a market amongst other native populations in the Empire or China should be taken into account.

It is along such lines that a big success is assured. Such a development means the addition of a vast body of new consumers of canned foods. If the development is a success it means that an essential service is performed for these consumers, adding to the amenities of life.

British leaders in commerce, finance, and industry do not yet grasp the economic importance of the canning industry. They do not realise that it has provided for agriculture and food distribution a similar modern revolution to that provided for transport by the motor-car.

In addition to the expansion already mentioned in the United States, the Dominions, and Japan, there has been established a large canning industry in Italy, France, Norway, Holland, and other European countries. The Soviet Government is also pressing forward with the erection of 55 large canneries in different parts of Russia. It will be a reproach to the leaders of British enterprise if they do not achieve a corresponding development in our vast native Empire.

In order to avoid that reproach and to bring about the necessary activities, it is essential that there should be a fuller realisation of what the modern canning industry does for other countries, and can do for the Empire. There are three aspects to be examined :—

(1) The effect on agricultural production.
(2) The effect on distribution.
(3) The combined effect on the consumers.

(1) *The effect on agricultural production.* The canning industry first of all established itself on a large scale in districts where there was a mass concentration of a particular product like salmon in North America, meat in Chicago, sardines in Norway, and peaches in California. Until the machinery of canning was

applied to those masses of products in those localities the food could not be harvested. In each case the adjacent market was very small and the goods perished if they were moved to any distance in search of a market. The coming of the canning industry revolutionised that situation. The crop or yield could be harvested to the full, and it was found that the whole harvest could be profitably marketed thousands of miles across the seas in many countries. It was found that the same problem arose in respect of other products, and that the problem could only be solved by the same method. Agriculturists in certain areas found their land more suitable for growing peas, for instance, than for other products. Very soon the local markets were glutted and the goods perished on the way to more distant markets. The result was the ruin of the producers, and the abandonment of cultivation. There are farmers in Kent who sowed their land for peas only to find when the harvest came that they could not obtain a price in Covent Garden sufficient to pay for the picking. Some years large quantities of beans are left unpicked in Worcestershire, and there have been years when certain fruits have been left to drop and rot. This situation leads to the ruin or discouragement of the producers and the abandonment of cultivation. In America they have applied the machinery of canning to one product after another, and have restored extensive acreages to profitable cultivation. In 1928 over 255,000 acres were used for growing tomatoes, and over 200,000 acres for growing peas for canning. Altogether over 100,000,000 cases of cans of vegetables were produced. The States of California and North Western America have developed an enormous fruit cultivation that would have been non-existent apart from canning. New fruit areas in Australia and South Africa have been developed during recent years, which would have been impossible without canning. A great new industry has benefitted Hawaii and Malaya in canned pineapple. The canned milk industry is of great importance in the production of Switzerland and Holland, and because of the Canning industry for milk there is made possible a large profitable dairy industry as well. So one might quote examples from other parts of the world as to other products, showing how agricultural production on a big scale is made possible where otherwise it was impossible. Why should India import large quantities of canned milk? The concentrated production of milk and dairy products around canneries in certain localities in India might lead to successful agricultural developments as in Switzerland or Holland. The canning of fruit or vegetable products in the best localities might make the production of such commodities more profitable than at present. Why should the Straits and the African Colonies import large quantities of fish from America? There are larger fishing grounds around the Empire that could be harvested for the Empire's needs.

(2) *The effect on distribution*. Once the perishable products produced on a large scale in a favourable locality are safely in the can, the marketing of the harvest is not limited to days but can proceed through the year. It is not limited to a small adjacent market but can be marketed in every part of the producing country or overseas. The financial handling is simplified, as canned goods are good

security and can be financed like non-perishable commodities. Special products limited in their production to certain localities are favoured by people all over the world, like pineapple, grapefruit, etc.

(3) *The combined effect on the consumer.* The large scale canning of commodities makes possible prosperity to the producer, but it is also a benefit to the consumer. The economics of canning make possible a large supply of the commodity, yielding the producer a profit at low prices, and adding a minimum to the cost of transport and distribution on the way to the consumer. Compare in England the price of a pound of fresh salmon with a can of salmon that has travelled thousands of miles from British Columbia. Compare the prices of fresh, often unripe peaches in England with canned peaches that have come 12,000 miles from Australia. If the special native foods of the native consumers in the various parts of the Empire were properly handled by a canning industry, the native consumers would be benefited with a more plentiful supply, a supply all round the year, a supply in perfectly sanitary condition and a supply cheaper on the year's average than is possible under the present conditions.

It is for the basic reasons summarised above that the strongest possible appeal is made to the Governors and authorities of every part of the Empire to wake up to a realisation of what this modern art can do for the benefit of the producers and consumers in their vast territories. If they grasp the three points they will see that it is a mistake to assume that native foods in cans would be dear and beyond the purse of the native consumers. Experience has proved that the question of cost often works the other way, and that on a commercial scale certain canned foods are cheaper for the masses of the people than the fresh foods as at present produced and marketed. That is why it was stated that the development of a great canning industry in the native Empire would contribute to the amenities of the population.

Viewed in this way the possibilities of development in the Empire are enormous. The varieties of foods consumed by the immense populations offer remarkable scope for such development. The economical advantages of canning can be applied to a large variety of products that have not yet been canned, and attention should be directed to such products ; that is products regularly consumed by the people that can be better organised for the benefit of the producer and the consumer through the medium of a canning industry.

So far emphasis has been laid on what must be the main issue, viz., the canning of the products of countries for consumption by the local population, or adjacent populations in the Empire, or the East. There are, however, in many parts of the Empire special products that might be canned for the world market. In approaching the consideration of this aspect of the question it is important that a too limited outlook should be avoided. Many British Directors and officials in positions of authority, who will necessarily have to lead the developments, have a very restricted knowledge of the canning industry. They think of canning as something confined to salmon, sardines, peaches, pears, pineapples, and bully beef. It is important for them to realise that practically every form of perishable food can be successfully canned. The enormous growth of the industry in America is due to the application of the canning industry to one new product after another. One of the biggest things in America, and it is very big in Italy, is the canning of tomatoes. The canning of tomato pulp for sauces, particularly as a contribution to the canning of fish, might be usefully developed in certain parts of the Empire for Empire use. All the usual garden vegetables are canned on a large scale. A large business has during recent years been developed in canned sauerkraut, which is simply cabbage fermented with salt. Its success is due to the healthful medicinal properties of that homely product. There may be special roots or vegetables that might be treated with salt or some other substance in the production of a valuable product in parts of the Empire. The biggest item of all in American canning is the canning of corn, and owing to the intensive scientific work made possible by the canning industry the quality of corn cobs has been raised by many degrees of perfection as a human food. Are there not great possibilities for the production of similar corn for human consumption in parts of the Empire? Single plots of as much as 7,000 acres are laid down on what were barren lands for the production of canned asparagus. There is an enormous unsatisfied world market for cheap canned asparagus. After many years of effort and loss the Americans developed the growing of figs, and their canned green figs are beginning to create a large new market throughout the world, but why figs from America? During recent years large factories have been built and more are building for the canning of grapefruit in Florida. Why should we not do this in the West Indies? Canned grapefruit has an enormous future, and the market has only recently been opened. A profitable industry has been developed lately in canned walnuts. There are many fruits grown in India and other parts of the Empire that the world has not yet had a chance to sample on a commercial scale.

These are illustrations of the possibilities and of the questions that we want every person interested in the Empire to keep on asking.

The Empire Canning Council is soliciting the assistance of the authorities in every corner of the Empire for the taking of a complete survey of all these possibilities. In making that survey, everything will depend upon the goodwill, earnestness, and open-minded enthusiasm of the investigators.

In connection with the survey, information is sought as to any problems or difficulties. One of the problems is the supply of suitable cans and closing machines for persons who are prepared to start canning in a small way. Much of the constant expansion in America is due to the great can-making Corporations who always encouraged a small man in some new distant part of the States by providing him with cans, machines, and technical help in order that he might get over his experimental period. Some organisation like the Empire Canning Council is necessary here for that purpose. The Council will welcome all questions, doubts, problems, and enquiries and will endeavour by means of technical information and assistance with the facilities required, to assist in the starting up of operations successfully. A scheme for the supply of cans and closing machines has been worked out on practical lines.

The progress of the American Canning industry has been aided by the capacity of big concerns like the California Packing Corporation, Libby's, and the Chicago meat packers. But the bulk of the American advance has after all been due to those who have started in a small way and built up their businesses. It would be a great thing for the Empire if one or more powerful central packing corporations, with substantial finance, could be formed in the City of London to lead the way by establishing canneries in different parts of the Empire. It might be worth while for some of the large rubber companies to consider the adding of canning operations to their business. Such action by powerful organisations with financial resources would lead to rapid development, and the example of their success would stimulate others. And why not such corporations in the City of London? Many pioneering companies have to the credit of this great City ventured their capital in the past on mining projects and rubber plantations in the early days when there was little accumulated experience, and the ventures were highly speculative. There is an old adage that no business is safer than a business dealing with food, because the human population keeps growing, and human stomachs have to be satisfied every day. There is available the remarkable record of the canning industry and its profits and success in various countries. It would appear that Empire Canning Corporations would be much less risky ventures than many of those referred to. They would be an excellent contribution towards Empire development, and they ought to be, if properly conducted, highly successful and profitable ventures.

We are not, however, going to wait upon the formation of such central corporations. If they come all the better. If not, we shall carry on assiduously with the stimulation of local projects.

Two years ago we began asking publicly why this country could not can peas and vegetables on a large scale. The result of asking such questions and publishing the achievements in other countries is to be seen in the factories put up by private individuals during the past two years, the factories that are now building, and those that are in contemplation. It is felt that by persisting in putting these questions in every part of the Empire, and in broadcasting information, and rendering assistance of a technical character, individuals will be roused as they have been in Great Britain to awaken to the opportunity that there is in the Canning industry.

It is possible, nay, almost certain that doubts and questions will occur to the minds of the authorities, firms, and enterprising persons in various parts of the Empire. All such persons are respectfully invited not to keep their doubts and problems to themselves, but to put them forward to the new Empire Canning Council, so that there may be an opportunity for them to be dealt with. In this way there may be many cases where doubt will be converted into certainty, and irresolution into enthusiasm.

DISCUSSION

THE CHAIRMAN, in opening the discussion, asked the lecturer to give in a little more detail an idea of the progress which the canning industry had made in this country during the last few years—a progress which had been largely the outcome of Sir Edgar's own personality and of his determination not to stop at mere talk about the subject. Personally, he was getting tired of hearing people telling doleful stories about the state of this country without attempting anything constructive. The audience had had put before them one suggestion as to how to improve British Trade, and at the back of that suggestion was the right man to carry it through. He hoped that Sir Edgar would receive the help and support of all those present in his admirable efforts.

A MEMBER OF THE AUDIENCE asked how many canning factories there were at present in England.

SIR EDGAR JONES replied that of commercial canneries equipped with the most modern type of plant there were now eighteen operating in this country, whereas four years ago there was not one with modern plant. The number of people canning peas and vegetables was increasing every day all over the country. In a few years the canning of peas and vegetables in this country would reach very large proportions. There had also been an enormous increase in the canning of soups and of certain mixed products, and it was also hoped that the canning of fish would increase.

A MEMBER OF THE AUDIENCE asked if there was any ground for the prejudice which existed against canned foods from the point of view of health.

SIR EDGAR JONES replied that a good deal of prejudice still existed in certain quarters ; there was not much of it left amongst the masses of the peoples in any country, but there were a few superior people, who unfortunately occupied positions of considerable influence, who still held to that antediluvian prejudice. His Council had circulated a booklet written by Sir William Arbuthnot Lane which was based on an enquiry carried out by a committee of medical men appointed by the New Health Society, which established (as had been established in other countries by scientific tests) that as regards vegetables cooked in the can these were definitely more healthful articles of food than vegetables cooked in an open saucepan, and that in the case of fruits the cooking in the syrup did not seem materially to affect any of the qualities of the fruits.

MR. AVERN PARDOE (President, Canadian Canners) predicted that the canning industry recently started in this country would grow into the most lusty infant which this country had ever had on its hands. Speaking from his experience in Canada, he could state that the demand for such canned goods would be enormous. Experience proved that once the industry was started in any part of the world the difficulty was to keep pace with the demand.

MR. C. C. BROWN DOUGLAS asked if it would not require a great deal of propaganda work to induce the very conservative people in the East to change their diet and turn from rice and other simple foods to canned foods.

THE CHAIRMAN replied that it seemed to him, after listening to the lecture, that there were two answers to such a question. The first was that it would, of cour require a good deal of effort, but what we were suffering from, in his humble opinion, in this country was that we were making no effort at all on that sort of lines. The second was that, as he understood it, Sir Edgar would never suggest for one moment that anything was to take the place of rice for the Eastern people referred to. The object was to get a more evenly balanced diet for those people. Personally, he believed that only an initial effort was required to make the canning industry a very progressive business, and one which would be to the benefit of every part of the Empire.

MAJOR SIR HUMPHREY LEGGETT, R.E., D.S O., on behalf of the Royal Society of Arst, said that on the point as to whether the native population of the Empire would take to canned foods, he could speak with some knowledge of tropical Africa with its 80 millions of people. He had seen those people take to the tinned foods which America had showered upon them. It was not a question of whether they would take such foods if they could get them ; it was only a matter of whether they were able to afford to buy them. The poorer people in the interior had taken, within comparatively recent years, to the eating of dried meats which had been put up for them in pemmican form by an effort of the Tanganyika Government. At the south end of Lake Victoria there was now a meat factory where the surplus cattle were turned into dried meat, and a big distribution of such meat took place to every native who could afford to purchase it. Again, every native who could afford to buy it wanted to get fish. It might surprise many of those present to know that on Lake Victoria 60,000 fishing nets of 100 yards long each were used every year. That meant, 3,000 miles of fishing nets, which represented a tremendous quantity of fish. There was a fishing population of 20,000 people, but there was a consuming population within a 60-mile radius of the lake of about six millions, all anxious to get fish which, under present conditions, by the time it got to them, was positively stinking. The possibility of using products which were now thrown away was unlimited, if only the canning industry could be started. All the African territories were protected; they had to get their revenue from customs duties, generally 20 per cent. That meant that the local product at once enjoyed that advantage. There were gluts of fruit and fish in both West and East Africa. It was only a question of how to turn them to account. Nobody had tried to tackle the problem, but had been satisfied to take the imported article which had been thrown at them from Japan or America. The Empire Canning Council had put before the whole Empire a great idea The Council had offered help. He knew that in parts of the Empire people might say, "A canning factory will cost us thousands of pounds ; it requires a huge technical staff and we cannot tackle it," but the Canning Council had shown that it could be done on a small scale, and they were prepared to give help in advance in the matter of technical difficulties. The Empire Canning Council, therefore, offered a great opportunity to the people who lived in the territories of the Empire to have an economic future for themselves which would result in benefiting their own pockets and also benefiting the millions of people under their care, by giving them a great variety of foods and making them spend their money inside the Empire instead of buying from outside

MR. B. T. KESAVAIENGAR (Trade Commissioner for Mysore) thanked Sir Edgar [illegible]nes for having put before the meeting a scheme which held immense possibilities [illegible]r the development of that part of the Empire which he represented in this country, [illegible]mely, Mysore State. There were numerous articles of food in that State, for [illegible]stance, mangoes, which were capable of being canned and of being put, not only [illegible] the local market but on outside markets—products which were now, owing to the absence of scientific canning, left to rot. The lecturer's scheme gave an opportunity to Mysore of establishing an industry on a commercial and useful scale which would be of great benefit to the State and its inhabitants. There was always one difficulty which presented itself to any industry which wished to establish itself in India, namely, that of obtaining the necessary initial scientific training and equipmen but under proper guidance Indians would readily respond to any advance which would mean prosperity to them and to their country.

Mr. R. A-Ababrelton said that as coming from South Africa he heartily supporte Sir Humphrey Leggett in what he had said. Everyone knew how terribly the agricultural industry in this country was suffering, and it seemed to him that in Si Edgar Jones' scheme lay one solution for the present troubles of that industry.

Mr. W. A. Morris (Empire Economic Union) said the lecturer had given seve reasons why the Empire Canning Council had excluded the four Dominions fr the scope of its work. It seemed to him however that there were at least two rea why those Dominions should not be excluded. The first was that one did not us can for a local market ; one did not can peaches for California or salmon for Al Therefore wider markets had to be considered. The question was an Empire c They did not want to begin by causing over-production in the Empire, and the f Dominions were already amongst the most important fruit-producing areas in t Empire. That was one reason why the Dominions should be considered. A secon reason was that the imports of canned produce in Great Britain represented abou one million pounds' worth of tin plates. In Canada there were tin plate industrie in Australia that side of the matter was not so highly developed, and there were no in New Zealand and South Africa. The National Federation of Iron and St Manufacturers had gone into the question, and had made it quite clear that if anythin could be done to stimulate the canning industry in those Dominions it would be of very great use indeed to the South Wales industry. It seemed to him, therefore, that the Empire Canning Council would be doing very useful work indeed in including in its scope the Dominions as well as the Colonies.

Sir Edgar Jones said the reasons for the Council concentrating for the present on the non-Dominion parts of the Empire were that the four Dominions had established canning industries and had already a marketing organisation. They were also in a position to deal with the problem of the supply of cans, and had got over the early stages of research and technical work. The Council were dealing with parts of the Empire where those conditions did not exist. They thought it better to concentrate their time, energy and attention on those parts of the Empire and give them a start. No doubt later on the Council would consider it quite desirable to include the Dominions.

Mr. W. B. Adam (University of Bristol Canning Research Station, Campden) drew attention to the historic fact that the origin of fruit preservation in this country had been a lecture before the Royal Society of Arts in 1808 by Thomas Saddingto It was now over 120 years since that lecture had been given, and it was about that some move was made in the matter.

The Chairman thanked the last speaker for his very sensible remark. Engli were much too fond of talking about their history and traditions instead of them as a sort of springboard from which to jump off to further successes.

Mr. S. G. Soman pleaded with those influential gentlemen who formed the Empire Canning Council not to be afraid to make powerful representations to whatever Government might be in power at the moment to the effect that it was useless for any part of the Empire to attempt to develop any industry unless that industry received proper preferential treatment in every market in the Empire.

The Chairman pointed out that the present meeting was not a political meeting. If those who believed that the scheme put forward in the lecture was a good economic proposition would only get on with it, they would find that not only one but all three of the political parties would welcome it with open arms. It was no good waiting until those people who did not at present believe in preferential tariffs were converted.

A hearty vote of thanks was then accorded to Sir Edgar Jones for his interesting cture, and a vote of thanks to the Chairman for presiding terminated the meeting.

JERRY BUILT HOUSES

An interesting case came up in the courts this week about the cost of a house of [illegible]e Surrey Garden Village Trust. During the proceedings the Defendant said "I cannot get the money for it, it is falling to pieces!" And yet these are the houses that people are asked to put all their savings into purchasing as a good investment. This is only one example out of thousands of jerry built villas which [illegible] being put up all round London, without design or foundations and built of [illegible]p materials with the most inferior workmanship, it is only because they are [illegible] badly put together that often it is necessary to put on cheap decoration, half timbering, etc. The whole system is disastrous in every way for it is not only an offence against the beauty of town and countryside, but it is not even structurally sound, and unfortunate people are being led away by attractive advertising to put all their savings into these ugly slipshod villas. Already we see the results as in cases like this—we hope this will be an example and a warning!

MEETINGS OF THE SOCIETY

Ordinary Meetings

Wednesday evenings at 8 o'clock.

May 7.—S. K. **Ratcliffe**, "National Parks." **Major-General Sir Fabian A.** [illegible]are K.C.V.O., K.B.E., C.B., C.M.G., LL.D., Permanent Vice-Chairman, [illegible] War Graves Commission, will preside.

[illegible] 14.—**Charles E. Douglas**, M.I.Mech.E., M.I.Struct.E., A.M.I.Pet.I., [illegible] Cultivation and Treatment." **Sir Edward Davson**, Bt., Deputy Chairman, [illegible] Producers' Organisation, will preside.

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